USDA United States Department of Agriculture

Supplemental Draft Environmental Impact Statement for the Enlargement of Monument #1 Reservoir and Hunter Reservoir

Monument #1 Reservoir

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Forest Service

Grand Mesa, Uncompahgre and Gunnison National Forests

Grand Valley Ranger District

June 2017

Enlargement of Monument #1 Reservoir and Hunter Reservoir
Supplemental Draft Environmental Impact Statement
Mesa County, Colorado

Lead Agency:	**USDA Forest Service**
Cooperating Agencies:	**U.S. Army Corps of Engineers** **Colorado Division of Natural Resources**
Responsible Official:	**Scott G. Armentrout, Forest Supervisor** **2250 Highway 50, Delta, CO 81416**
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Abstract: The Ute Water Conservancy District proposes to enlarge two reservoirs in the Leon Creek watershed, located east of Grand Junction, Colorado: the Monument #1 Reservoir and Hunter Reservoir. The combined volume of the reservoirs would be approximately 6,607 acre-feet. Construction may take 7-9 years. If both reservoirs were approved, road infrastructure would be upgraded in year 1, Monument #1 would be enlarged in years 2-5 and Hunter would be enlarged in years 6-9. The Forest Service, in evaluating Ute Water's application, considered three alternatives: 1) the proposed action (both reservoirs); 2) enlarging Monument #1 to a size sufficient to store approximately all 6,598 acre-feet of water; and 3) a no-action alternative. Issues related to Roadless Areas and wetlands were the primary drivers of the decision to prepare an Environmental Impact Statement. Should the deciding official select an action alternative, that decision would entail the authorization of an enlarged reservoir footprint at one or more locations, various road-related construction activities, construction activities at one or more reservoir sites, access to borrow material, and mitigation activities on National Forest lands.

It is important that reviewers provide their comments at such times and in such a way that they are useful to the Agency's preparation of the EIS. Opportunity to comment on the Draft EIS ends 45 days following the publication date of the Notice of Availability of the Supplemental draft environmental impact statement in the *Federal Register*. Comments should clearly articulate the reviewer's concerns and contentions. The submission of timely and specific comments can affect a reviewer's ability to participate in subsequent administrative review or judicial review. Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative or judicial reviews.

Send Comments to:	**Clay Speas** **GMUG National Forest Supervisor's Office** **2250 Highway 50, Delta, Colorado 81416** **970.874.6650; cspeas@fs.fed.us**
Date Comments Must Be Received:	**July 31, 2017**

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Summary

The Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG) proposes to authorize enlargement, in succession, of Monument #1 Reservoir and Hunter Reservoir. Both facilities are located east of Grand Junction, Colorado, on the north side of the Grand Mesa (Figure 1). Leon Creek is tributary to Plateau Creek which is tributary to the Colorado River. This action is needed, because Ute Water is implementing a proactive plan to have water stored for increased demand between now and 2045. Storing approximately 6,600 acre feet of water in the Leon Creek watershed is one component of Ute Water's plan to provide additional water. In authorizing enlargement of these facilities the Forest Service will concomitantly authorize maintenance work for roads and trails on which construction equipment will travel during the construction period. Additionally, permits will be issued for a worker's camp, borrow material, and activities associated with mitigation.

The agency included two alternatives to the proposed action:

- Alternative 2: building a larger reservoir at the Monument #1 Reservoir site. Alternative 2 is the agency's preferred alternative.
- A No Action Alternative.

The agency formulated several major conclusions during the analysis:

- Potential impacts to wetlands are the major consideration for this project: enlarging Monument #1 and Hunter Reservoir will inundate 57.6 acres of wetlands. However, proposed mitigation for these impacts will offset both the loss of area and function of the affected wetlands.
- Best-available climate change modelling data suggest Monument #1 and Hunter Reservoirs are likely to remain snow-dominated for the next 30 years.
- The area is likely to see an increase in vehicle traffic during the 7-9 year construction window. Improvements to roads will allow 2-wheel drive vehicles along a portion of National Forest System Road (NFSR) 262, which, in its current state, is passable only by ATVs, UTVs, and 4-wheel drive vehicles. Road improvements higher in the watershed, along NFSR 262, NFSR 280, and NFST 518, will not render these routes passable by low-clearance vehicles. The Forest Service will not maintain NFSR 262 in an improved state following the completion of the project; therefore, increased vehicle traffic on this route will return to current levels within 1-2 years following the completion of construction..

Based upon this analysis, the responsible official will decide the following: 1) whether to select an action alternative (Alternative 1 or 2) or the No Action Alternative (Alternative 3); and 2) if an action alternative is selected, prescribe terms and conditions (including compensatory mitigation) associated with special use authorizations and associated permits for construction activities on National Forest System lands.

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Summary of Changes between Draft and Supplemental Draft Environmental Impact Statements

The following changes have occurred since the Draft EIS was published:

- The scope of Proposed Action has increased to include Monument #1 Reservoir.
- Best Available Science and information collected regarding wetlands has been included.
- Mitigation measures have been identified.
- Alternatives considered in detail have changed.
- The Forest Service and EPA have identified Alternative 2 as the preferred alternative.
- Alternatives not considered in detail has been updated.
- The Colorado Roadless Rule has been formalized, which clarifies activities with regard to Proposed Action allowed in Roadless Areas.
- Analysis for alternatives has been updated.

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Chapter 1. Purpose of and Need for Action

The Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG) has prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Grand Mesa, Uncompahgre, and Gunnison National Forests Supervisor's Office, 2250 South Main Street Delta, Colorado 81416.

Background

In February 1998, the U.S. Bureau of Land Management (BLM) issued the Final EIS on the Plateau Creek Pipeline Replacement Project (BLM 1998); the Record of Decision was published in May of 1998. The replacement project was motivated primarily by deterioration of the existing pipeline. Ute Water made the proactive decision to enlarge the pipeline in order to prepare for expected increases in municipal water demand. As part of its analysis, the BLM considered 19 preliminary alternatives: three versions of a pipeline replacement and 16 alternatives to a pipeline. Among the 16 alternatives were alternative water development or storage locations, a trans-basin diversion, and treatment of Colorado River water via reverse osmosis filtration. Potential solutions included increased water conservation by customers and the unification of the water delivery services of the municipalities of Grand Junction, Clifton, and Palisade. In doing this, BLM analyzed the potential for some or all of Ute Water's anticipated future water demand to be met through actions other than additional water storage and diversion.

BLM's alternative analysis, described in detail in Appendix D of their Draft EIS, revealed that developing water in the Plateau Creek drainage was technologically and logistically feasible and met the project cost limitations proffered by Ute Water. Even more important to this analysis, BLM determined that developing water within the Plateau Creek drainage met "Ute Water's purpose and need and practicability, as defined in the Clean Water Act (BLM 1998)." BLM's decision was to authorize the replacement of the existing pipeline with one capable of transporting greater quantities of raw water. The BLM's decision anticipated Ute Water would develop water storage in the Plateau Creek watershed in order to meet future demands.

During the analysis of the Plateau Creek Pipeline Replacement Project, Ute Water commissioned a study to quantify their future water needs (Pearse and Associates 1995). The study, commonly called the Pearse Report, examined six potential growth paths for Mesa County's population, projecting 2045 population totals for the county between approximately 211,000 and 976,000. Data from the U.S. Census Bureau indicate the 2016 population of Mesa County was 150,083 (U.S. Census Bureau QuickFacts for Mesa County, Colorado; accessed April 28, 2017). It is possible to extrapolate the data presented in Table III-14 in the Pearse Report using the 2015 U.S. Census Bureau numbers and estimate Mesa County's 2045 population will be between 283,000 and 304,000. These estimates are approximately double Mesa County's current population and raw water demand is expected to increase commensurately.

A county population between 283,000 and 304,000 corresponds to a 2045 average annual water demand between 26.8 and 28.4 million gallons per day, or between 30,020 and 31,812 acre feet per year (Pearse and Associates 1995). Peak water demand can be estimated to increase to between 42 and 45 million gallons per day, between 47,377 and 50,188 acre feet (Pearse and Associates, 1995). Ute Water's water development plan is based on a firm yield (a quantity needed in a worst-case drought scenario) of at least 21,400 acre-feet. These estimates are about four times the average annual water demand in 1995 (Pearse and Associates 1995). The combined capacity of enlarged Monument #1 Reservoir and Hunter Reservoir,

Alternative 1 in this document, is 6,607 acre-feet and Alternative 2 would store 6,589 acre-feet. These volumes equate to approximately 31 percent of Ute Water's firm yield requirement in the year 2045.

Ute Water submitted to the Forest Service an application to enlarge Hunter Reservoir in 2005. Based on projections in the Pearse Report and BLM's authorization of an enlarged Plateau Creek Pipeline, Ute Water made the decision to perfect additional conditional water rights associated by enlarging Hunter Dam and submitted an application to Forest Service and U.S. Army Corps of Engineers (Corps). The application described a project that would expand the capacity of the reservoir from 110 acre-feet to 1,340 acre-feet.

The presence of a 47-acre wetland complex at Hunter Reservoir was the primary factor in the decision by the Forest Service to prepare an EIS for Ute Water's application. The Forest Service and the Corps, who participated in the analysis as a Cooperating Agency, published a Draft EIS in 2007. The Draft EIS disclosed the potential impacts of construction activities associated with enlarging Hunter Reservoir and mitigation measures directed almost exclusively at aquatic resources.

A September 17, 2007 letter from U.S. Environmental Protection Agency (EPA) on the Draft EIS prompted consideration of additional alternatives that prevented the inundation of wetlands within the footprint of an enlarged Hunter Reservoir. In response, the Forest Service began a study to determine the actual frequency and extent of fen wetlands on the Forest. The study, Inventory of Fens in a Large Landscape of West-Central Colorado, took four years, involved an interdisciplinary team of scientists, and was subjected to professional peer-review by wetlands scientists prior to publication (Johnston et al., 2012).

In 2011 the Corps, in response to Ute Water's application for a permit to enlarge Hunter Reservoir, began the process of identifying a "Least Environmentally Damaging Practicable Alternative" or LEDPA. The Corps' analysis took 18 months and included the Forest Service and Ute Water. The Corps' analysis included reconsideration of several alternatives that were eliminated in the Plateau Creek Pipeline Replacement Project EIS, including the treatment of Colorado River water and using groundwater aquifers as both a source and a point of storage for water. The Corps' analysis included 11 locations for new dams and 9 proposed reservoir enlargements. Two of the 9 enlargement alternatives were modifications of the original application to enlarge Hunter Reservoir. The enlargement of Monument #1 Reservoir (as described for Alternative 1 in this document) was one reservoir enlargement alternative.

On July 31, 2012, the Corps presented the Forest Service and Ute Water with its final technical report, which identified the enlargement of Monument #1 Reservoir as the preliminary LEDPA (USACE 2012). Monument #1 Reservoir was selected from the only two alternatives identified as "practicable" under the screening process used by the Corps: Hunter Reservoir and Monument #1 Reservoir.

Based on a firm yield need of 21,400 acre feet (URS 2009), Ute Water made the decision that it would pursue a "blended supply" approach whereby Colorado River water is mixed with water from the Plateau Creek watershed. Their approach entails the following: 1) develop Monument #1 Reservoir and Hunter Reservoir; 2) obtain approximately 3,000 acre-feet of additional water from the Colorado River; 4) acquire approximately 12,500 acre-feet of water from Ruedi Reservoir, which would be transported via the Colorado River. The intent of reservoir development is to store the approximately 6,600 acre feet of water at those locations during normal years and access them during drought years. Ute Water's plan would result in a firm yield of approximately 21,500 acre-feet. In February 2012, Ute Water also submitted an application to the Forest Service for authorization to enlarge Monument #1 Reservoir. The application, along with Ute Water's existing application to enlarge Hunter Reservoir, is Alternative 1 analyzed in this document.

In 2016 the Forest Service reinvigorated its analysis of Ute Water's proposal which included multiple meetings with Ute Water, the Corps of Engineers, and the EPA. In October 2016 the Corps of Engineers suggested a detailed analysis of a single reservoir at the Monument #1 site capable of storing the combined volumes of Monument #1 Reservoir and Hunter Reservoir (Table 1). A single reservoir at the Monument #1 site, the Corps pointed out, would obviate the need for enlarging Hunter Reservoir and minimize wetland impacts relative to Alternative 1. Monument #1 Reservoir was identified as the LEDPA in the Corps' 2012 alternatives analysis (USACE 2012). Forest Service communicated the Corps' suggestion to Ute Water in November 2016 and this alternative, Alternative 2 in this document, subsequently became the Forest Service's preferred alternative.

Purpose and Need for Action

The Organic Administration Act of 1897, which created the U.S. Forest Service (USFS), states the Forest Reserve System was created, in part, to insure the supply of clean water to those dwelling in the United States. Ute Water's application invokes the Forest Service's obligation to provide "favorable conditions of water flow" to the people in and around Grand Junction, Colorado. The purpose and need for the Forest Service action on the Hunter-Monument Reservoir Enlargement Project is to respond to applications submitted by the Ute Water Conservancy District (Ute Water) for special use permits to expand water storage for two reservoirs which would provide a portion of the Ute Water's anticipated future water demand via the Plateau Creek Pipeline. Under the Forest Service's special use regulations at 36 Code of Federal Regulations (CFR) 251, when a proponent submits an application for a facility or activity to be located on National Forest System (NFS) lands, the Forest Service is required to evaluate that application in accordance with screening criteria contained in 36 CFR 251.54 to insure that it meets certain criteria. Among others, criteria requires the application to comply with laws, regulations, and statutes, does not pose a significant or substantial risk to public health or safety, and is consistent or can be made consistent with direction in the applicable land and resource management plan (Forest Plan). If the Forest Service determines that the application meets the criteria, the application is then formally accepted. Forest Service acceptance does not guarantee project approval. The Forest Service has determined both applications meet the criteria described above and has accepted Ute Water's applications for both Hunter and Monument #1 Reservoirs.

The purpose of Ute Water's applications is to store a portion of their anticipated future water demand by enlarging one or two reservoirs. Additional stored water could be introduced into its treatment and delivery infrastructure during drought periods. The added storage capacity is needed in anticipation of projected human population growth in Ute Water's service area and concomitant increased demand for water. Over the next 30 years, municipal water demand in Ute Water's service area is expected to increase to more than 30,000 acre-feet. Alternative 1 will result in approximately 6,607 acre-feet of additional water storage, which is about 22 percent of the projected future water demand. Because Ute Water plans to operate these facilities differently than other reservoirs on the Grand Mesa by using the reservoirs to store water for use in times of drought, they have an additional need to store water at the highest possible elevation, where precipitation patterns are expected to remain snow-dominated and evaporation rates will be lowest.

Summary of Proposed Action

The proposed action is the enlargement of two existing reservoirs, Hunter Reservoir (T11S, R 92W, Sections 27 and 34, 6th PM) and Monument #1 Reservoir (T11S, R 92W, Sections 11 and 12, 6th PM; see Project Area map, Figure 1 below). Water impounded in these reservoirs would meet a portion of the Ute Water Conservancy District's anticipated future water demand. Water stored at these facilities would enter Ute Water's delivery infrastructure via the Plateau Creek pipeline. Ute Water estimates a 7-10 year

construction period to enlarge both reservoirs. Road infrastructure would be improved in year 1. Each reservoir enlargement is expected to take 3-4 years.

Table 1. Characteristics of existing and enlarged Hunter and Monument #1 Reservoirs.

	Hunter Reservoir	Hunter Enlargement	Monument #1 Reservoir	Monument # 1, Alternative 1	Monument #1, Alternative 2
Dam crest elevation	10,367	10,393	10,211	10,263	10,271
Dam height	11	37	28	80	88
Dam crest width	10	18	10	25	25
Dam crest length	290	1,312	520	1,810	1,860
Upstream dam slope	2.25:1	3:1	2.25:1	3.5:1	3.5:1
Downstream dam slope	2:25:1	2.5:1	2.25:1	3:1	3:1
Storage volume	59	1,340	446	5,267	6,598
Surface acres	20.2	79.1	37.9	155.3	177
Decreed storage	110	1,340	572	5,254	6,772
Service spillway elevation	10,364	10,388	10,206	10,258	10,266
Emergency spillway elevation	NA	10,389.5	NA	10,260	10,268

Numerous aspects of the proposed action and Alternative 2 would result in resource benefits:

- Improvements to NFSRs 262 and 280, and NFST 518 will benefit stream channels in East Leon Creek, Leon Creek, and Monument Creek. Road and trail improvements will also result in riparian wetlands restoration along these routes. Additionally, proposed re-routes of NFSR 280 and NFST 518 will relocate these routes away from cultural sites that are currently being impacted.

- Under both Alternatives 1 and 2 Ute Water would decommission Monument #2 Reservoir and transfer the point of storage for its water right into an enlarged Monument #1 Reservoir. Decommissioning the reservoir and removing the associated infrastructure, including an access road, would benefit wetlands as well as the Flattops-Elk Park Roadless Area in which Monument #2 Reservoir is located.

There are several potential sources of compensatory mitigation for resource impacts associated with Alternatives 1 or 2:

- Active restoration of the wetlands complex at Monument #2 Reservoir could be used as compensatory mitigation for wetlands impacts for Alternatives 1 or 2. Active restoration would involve actions specifically done in order to restore wetlands acres and function within the watershed. This site contains a fen, the functionality of which could be restored within 10 years.

- Active restoration of the wetlands complex at Jensen Reservoir could be used as compensatory mitigation for wetlands impacts for Alternative 1. Active restoration of the wetlands complex at this site would include actions specifically done in order to restore wetlands acres and function within the watershed. This site contains a large peat mat indicative of a relict fen wetland. There is a high probability that the functionality of the fen could be restored within 10 years.

- Ute Water has proposed a 0.5 cfs release from Hunter Reservoir during wintertime in order to improve habitat conditions in East Leon Creek and Leon Creek. This mitigation is only available if Alternative 1 is implemented.

- Under Alternative 2, Ute Water could make improvements to NFSR 280 that could serve as compensatory mitigation for wetlands impacts resulting from an enlargement of Monument #1 Reservoir. Ute Water and the Forest Service discussed improvements to NFSR 280 as a possible source of wetlands compensatory mitigation in a meeting on May 8, 2017.

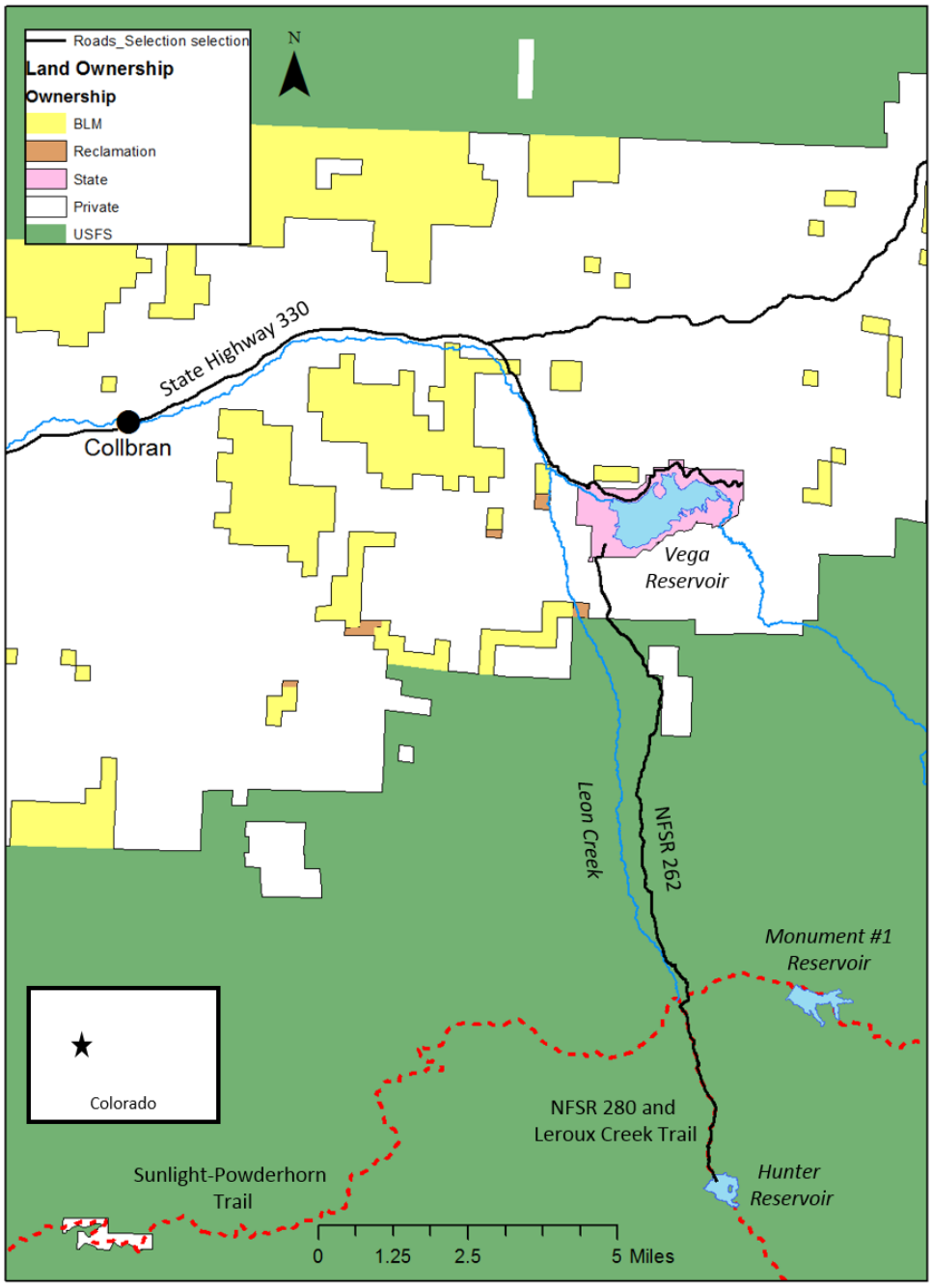

Figure 1. Project area.

Decision Framework

The Forest Supervisor of the GMUG is the Responsible Official for this proposal. Given the purpose and need, the Responsible Official will review the Proposed Action, other alternatives, and mitigation measures in order to make the following decisions:

- Whether or not the proposed alternatives address the issues, are responsive to law, regulation, policy and Forest Plan direction, and meet the purpose of and need for action in stated above.
- Whether or not the information in this analysis is sufficient to implement proposed activities.
- Which alternative, if any, to approve
- If an alternative is selected on NFS lands, under what conditions and by which methods implementation of the alternative and associated activities would be conducted.
- Whether or not the proposed mitigation is appropriate to offset impacts to resources as a result of implementation of alternatives.

Authorities

Environmental protection and management is guided by many laws, regulations and executive orders. Following is a description of the principal laws, policies, and regulations that guide the Forest Service and the Corps in the evaluation of applications such as the Hunter-Monument Reservoir enlargement project.

Laws

Title V, Federal Land Policy and Management Act of October 21, 1976 (43 U. S. C. 1761-1771). Title V of the Federal Land Policy and Management Act (FLPMA) authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse NFS lands. Section 505 requires terms and conditions associated with permitted right-of-ways to *minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment*.

Organic Administration Act of June 4, 1897, as Amended (16 U. S. C. 475). This act contains the initial, basic authority for watershed management on NFS lands. The purpose for the establishment of National Forests, as stated in the act, includes securing favorable conditions of water flows. This is the basic authority for authorizing use of NFS lands for other than rights-of-way under FLPMA.

Act of March 3, 1891 (32 Stat. 1095) (43 U. S. C. 946-949). This act was primarily to repeal timber-culture laws, but sections 18 to 21 provided for the granting of rights-of-way to ditch companies for legal irrigation and drainage purposes. TFLPMA repealed this statute; however, it did not terminate those rights-of-way in existence at the time of passage of FLPMA.

Watershed Protection and Flood Prevention Act of August 4, 1954, as Amended. (68 Stat. 666; Pub. L. 83-566; 16 U. S. C. 1001). This act authorizes the Secretary of Agriculture to cooperate with the states and their political subdivisions and local public agencies in preventing watershed damages from erosion, floodwater, and sediment, and in furthering the conservation, development, utilization, and disposal of water. The act also authorizes the Secretary to cooperate with other federal, state, and local agencies in making investigations and surveys of the watersheds of rivers and other waterways as a basis for planning and developing coordinated programs, and to pursue additional works of improvement on the 11 watersheds authorized by the Flood Control Act of December 22, 1944, as amended.

Clean Water Act of 1977 (33 U. S. C. 1251, 1254, 1323, 1324, 1329, 1342, 1344). This series of laws was written to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (Section 101). Congress sought to sustain the integrity of water quality and aquatic habitat so that waters of the United States will support diverse, productive, stable aquatic ecosystems with a balanced range of aquatic habitats. All issues are framed by the intent of Congress to improve and preserve the quality of the Nation's waters (540 F. 2d 1023; 543 F. 2d 1198; 612 F. 2d 1231; 97 S. Ct 1340; 97 S. Ct 1672).

- Section 101(g) states "the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated, or otherwise impaired by this Act," which is codified in 33 CFR 320.4, general policies of the Corps of Engineers in evaluating permit applications.

- The Forest Service must comply with federal, state and local water quality laws and rules, coordinate actions that affect water quality with States, and control non-point source pollution (Section 313).

- The Forest Service must apply Best Management Practices, considering local factors, to control non-point source pollution and meet water quality standards (Sections 208, 303, and 319). State-classified water uses, and the water quality they need, must be sustained to comply with the anti-degradation policy, unless States decide that vital economic and social development justify impacts (40 CFR 131.12).

- Waters of the United States include streams, oceans, rivers, and lakes and wetlands adjacent to these features. Aquatic ecosystems are waters of the United States that serve as habitat for interrelated and interacting communities and populations of plants and animals (40 CFR 230.3).

- Section 404 authorizes the Corps to issue permits for discharge of dredged or fill materials into waters of the United States at specified sites (33 CFR 320.2(f)). The selection and use of specified sites is directed by guidelines developed by the Corps at 40 CFR 230. No discharge of dredged or fill material will be permitted if there is a practicable alternative which would have less adverse impact on the aquatic ecosystem, including special aquatic sites (40 CFR 230. 10(a)). Special aquatic sites are sanctuaries and refuges, wetlands with a direct surface connection to waters of the Unites States, mud flats, vegetated shallows, coral reefs, and riffle-pool complexes (40 CFR 230.3).

- In determining whether to issue a 404 permit, the Corps can consider mitigation measures, including actions that avoid, minimize, rectify, reduce, or compensate for resource losses (33 CFR 320.4(r)). Compensatory mitigation can be required as a condition of a 404 permit to ensure the permitted activity complies with the Section 404(b)(1) guidelines at 40 CFR 230 (33 CFR 332.1(c)(3)) and to offset environmental losses from unavoidable impacts of the permitted activity (33 CFR 332.3). Compensatory mitigation may be restoration, enhancement, establishment or preservation of aquatic resources commensurate with the amount and type of loss of aquatic functions due to the permitted activity.

National Forest Management Act of 1976. (16 U.S.C. 1600-1602, 1604, 1606, 1608-1614). This act substantially amends the Forest and Rangeland Renewable Resources Planning Act of 1974. The act strengthens the references pertaining to suitability and compatibility of land areas, stresses the maintenance of productivity and the need to protect and improve the quality of soil and water resources, and avoids permanent impairment of productive capability of the land.

The National Environmental Policy Act (NEPA) of 1969 (16 U. S. C. 4321 et seq.). This act sets forth requirements to consider the environmental impact of proposed actions; identify adverse environmental effects which cannot be avoided; consider alternatives to the Proposed Action; consider the relationship between local short-term uses and long-term productivity; and identify any irreversible and irretrievable commitments of resources.

National Forest Roads and Trails Act of October 13, 1964, as amended (16 U.S.C. 532-538). This act authorizes road and trail systems for the national forests. It also authorizes construction and financing of maximum economy roads, and imposition of requirements on road users for maintaining and reconstructing roads, including cooperative deposits for that work.

Materials Act of July 31, 1947 (61 Stat. 681, as amended; 30 U.S.C. 601-604). This act provides for the disposal of mineral materials on the public lands through bidding, negotiated contracts, and free use.

Executive orders (EO)

EO 11990 of May 24, 1977. This order requires each agency to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Section 5 of the order states, "…[E]ach agency shall consider factors relevant to a proposal's effect on the survival and quality of the wetlands. Among these factors are: (a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion; (b) maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and (c) other uses of wetlands in the public interest, including recreational, scientific, and cultural uses." This order directs the Forest Service to analyze impacts to and coordinate mitigation for wetlands while meeting the needs of the human environment.

Regulations

FSM 2600 Chapter 2631.3. This chapter of the Forest Service Manual provides direction on the conservation and restoration of fen wetlands.

36 Code of Federal Regulations (CFR) 251(B). This subpart provides direction for special uses management on NFS lands, including guidance pertaining to the special-use application process; terms and conditions of use; rental fees; fee waivers; termination, revocation, suspension, and modification of existing authorizations; and permit administration.

36 CFR 219. These regulations implement the National Forest Management Act of 1976 (16 U. S. C. 1600 et seq.), require consideration of the relationship of nonrenewable resources, such as minerals, to renewable resources, and set forth the minimum requirements for integrating the nonrenewable mineral resource into a forest plan.

36 CFR 228. These regulations set forth rules and procedures governing use of the surface of NFS lands in conjunction with operations authorized by the general mining laws, oil and gas leasing, and mineral material disposal laws.

36 CFR 294.40-49. These regulations pertain to management of Colorado Roadless Areas.

40 CFR Sections 1500-1508.28. This regulation directs the Forest Service to apply environmental analysis to environmentally significant decision points during NEPA activities.

Grand Mesa, Uncompahgre, and Gunnison National Forests Land and Resource Management Plan (Forest Plan) (1991, as amended)

Special Use Management: Forest Plan, pp. III-71: This provision instructs the GMUG to act on special use applications in a prioritized order. Acting on land use activity requests that contribute to increased economic activity associated with National Forest resources (e. g., oil and gas), is second of three priorities.

Two management prescription areas, 6B and 7A, apply to the Project Area.

- Management Prescription Area 6B – The emphasis is on maintaining soil and vegetation condition and providing forage for livestock production. The area is managed for livestock grazing. Intensive grazing management systems are favored over extensive systems. Range condition is maintained through use of forage improvement practices, livestock management, and regulation of other resource activities. Investment in structural and nonstructural range improvements to increase forage utilization is moderate to high. Structure improvements benefit, or at least do not adversely affect wildlife. Conflicts between livestock and wildlife are resolved in favor of livestock. Nonstructural restoration and forage improvement practices available are seeding, planting, burning, fertilizing, pitting, furrowing, spraying, crushing and plowing. Cutting of encroaching trees may also occur. Investments are made in compatible resource activities. Dispersed recreational opportunities vary between semi-primitive non-motorized and natural adjacent to roads. Management activities are evident but harmonize and blend with the natural setting.

- Management Prescription Area 7A – The emphasis is on providing even aged saw timber production on slopes less than 40 percent. Management emphasis is on wood-fiber production and utilization of large round wood of a size and quality suitable for saw timber. Engelmann spruce-subalpine fir clear cuts are less than 5 acres in size to promote natural regeneration. The area generally will have a mosaic of fully stocked stands that follow natural patterns and avoid straight lines and geometric shapes. Management activities area not evident or remain visually subordinate along Forest arterial and collector roads and primary trails. Management activities will meet the adopted visual quality objective (VQO). Natural recreation opportunities facilitated by roads are provided along forest arterial and collector roads. Semi-primitive motorized recreation opportunities are provided on those local roads and trails that remain open. Semi-primitive non-motorized opportunities are provided on those that are closed.

Public Involvement

For the current agency actions, a Notice of Intent (NOI) was published in the Federal Register on January 13, 2016. The NOI asked for public comment on the Forest Service's preparation of a supplement to the June 2007 Draft EIS for the proposal, by the Ute Water Conservancy District, to enlarge Hunter Reservoir. As noted in the NOI, the supplement included responding to the original application to enlarge Hunter Reservoir and to the application to enlarge Monument #1 Reservoir.

For the original application, a scoping notice was published on July 29, 2005 and an NOI describing the agency's intent to prepare an Environmental Impact Statement for the project was published on October 26, 2005. The 2005 NOI highlighted impacts to wetlands around Hunter Reservoir as the impetus for preparing an EIS. Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address. All significant issues identified in the 2007 DEIS have been carried forward in the analysis in this document. Additionally, climate change has been identified as a significant

issue for this analysis. Public comments on the agencies' 2007 DEIS, the agencies' response, as well as comments received following publication of the January 13, 2016 NOI are available in the project record.

The Forest Service received three comment letters in response to the January 13, 2016 NOI. Two letters were authored by environmental groups. These letters expressed concern about the need to build reservoirs as well as the potential for enlarged reservoirs to impact wetlands. A third letter was authored by the EPA, who reiterated their concerns about the range of alternatives considered by the Forest Service and potential impacts to wetlands in the Leon Creek watershed.

Issues

The Forest Service separated the issues into two groups: those carried forward for analysis and those not carried forward for analysis. Issues not carried forward for analysis met one or more of the following criteria: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record.

The Forest Service identified the following significant issues during scoping:

Air quality

The construction phase of the project will last 7-9 years and involve thousands of hours of heavy equipment and vehicle use in the Leon Creek watershed. Vehicle emissions are a source of greenhouse gases and could affect air quality in the watershed.

Aquatic Wildlife

Sedimentation resulting from dam reconstruction and road construction, use and maintenance may reduce water quality and affect fish populations and aquatic habitat. Operation and maintenance of the reconstructed dam and enlarged reservoir may affect fisheries downstream and the aquatic environment by altering stream flow patterns and by changing the water temperature. Reconstruction and operation and maintenance of the dam and an enlarged reservoir may affect fish and wildlife habitat of special status species, such as federally listed and Forest Service sensitive species.

Recreation and Transportation

Enlarging Hunter Reservoir requires a portion of the Leroux Snowmobile Trail (NFST 742) along the southwest side of Hunter Reservoir be relocated following construction. Enlarging Monument #1 Reservoir requires a portion of the Sunlight-Powderhorn Snowmobile Trail be relocated following construction. Enlarging Monument #1 Reservoir also requires a portion of the Monument ATV Trail (NFST 518) to be relocated following construction. Project activities could remove dispersed campsites during and after reservoir construction and filling. Project construction activities may make NFSR 262 and 280 and NFST 518 temporarily inaccessible.

Roadless Areas

Activities associated with the enlargement of the reservoirs could cause Roadless area characteristics within the Flattops and Elk Park Colorado Roadless Areas to be altered. Alternatives 1 and 2 involve construction within Colorado Roadless Areas.

Soils

Dam reconstruction could directly impact soils within the landscape where construction activities would occur. The soil in those areas could be altered by heavy equipment, which would affect densities, infiltration rates, soil structure, and overall productivity. Disturbed areas may experience erosion until they are stabilized.

Terrestrial Wildlife

Reconstruction and operation and maintenance of the dam and an enlarged reservoir may affect terrestrial wildlife habitat for several species, including Canada lynx.

Water Resources

The change in water storage and water management may affect the base flow and peak flow conditions downstream from dams. Dam construction, road grading and leveling and placement of stream crossings along access roads could produce temporary increases in sedimentation and erosion downstream in Leon Creek.

Wetlands

Wetlands will be affected by all alternatives, including the No Action Alternative. Action alternatives described in this document would result in 33 to 58 acres of existing wetlands being inundated. The wetland complex at Hunter Reservoir includes a 1.9-acre fen wetland, for which the Rocky Mountain Regional Office of the Forest Service has issued guidance (FSM 2631.3), which directs the agency to "make every reasonable effort to design projects to avoid adversely impacting the functions and ecological services of fens." There are five potential locations for mitigation activities within the Plateau Creek watershed, if prescribed.

Issues Not Addressed

The following issues identified during scoping have not been carried forward for analysis in this EIS because they were outside the scope of the Proposed Action; or had already been decided by law, regulation, 1983 GMUG Land and Resource Management Plan (Forest Plan), or other higher level decision; or were irrelevant to the decision to be made; or were conjectural and not supported by scientific or factual evidence.

Health and safety

Substantial renovation of Hunter Dam is required by the Colorado State Engineer to address long-standing issues with regard to the safety of the existing dam and the potential for failure or overflow. Health and safety issues associated with Hunter Dam would be addressed if Alternative 1 was implemented. Under Alternative 2, safety issues at Hunter Reservoir would remain unresolved; however, the GMUG has authority to authorize such modifications as needed under the terms of the existing special-use authorization for Hunter Reservoir.

Other Related Efforts

The National Environmental Policy Act encourages the use of tiering (40 CFR 1502.20) and incorporation of existing information by reference (40 CFR 1502.21) when preparing EISs. Tiering and incorporation by reference are used when previous NEPA efforts or other environmental analyses contain discussions or information pertinent to the issues considered in an analysis. This analysis will tier to or incorporate information by reference from the following documents.

The *Plateau Creek Pipeline Replacement Project* EIS was issued by the BLM in 1998. The document and its Record of Decision contain information relevant to the development of a Purpose and Need statement in this analysis as well as information related to various alternatives considered but not carried forward for detailed analysis in this document.

In 1998 the U.S. Fish and Wildlife Service issued a Biological Opinion on Ute Water's proposal to replace and enlarge the Plateau Creek Pipeline. In that document the Service analyzed all future water development in the service area of an expanded pipeline. That Biological Opinion and Sufficient Progress Memoranda issued by the Service are incorporated into this document by reference. Water depletions associated with all action alternatives in this document are covered by that Biological Opinion and related actions by Ute Water. On August 22, 2016, the Forest Service received confirmation from the U.S. Fish and Wildlife Service that the 1998 Biological Opinion is still in force for this project.

A Draft EIS for the enlargement of Hunter Reservoir was issued by the Forest Service in 2007. Information included in that document on environmental conditions that have not changed since 2007 has been incorporated into this analysis.

In 2012 the Corps released a technical report titled *Hunter Reservoir Enlargement Screening Analysis*. The report detailed the process and results of an inter-agency analysis led by the Corps to identify alternatives to Ute Water's proposal to enlarge Hunter Reservoir. Much of the information in that report was incorporated into the section of this report detailing alternatives considered but dismissed from detailed analysis.

Section 102(H) of the National Environmental Policy Act instructs federal agencies to use ecological information in planning and development of projects. NEPA (40 CFR 1501.2(b)) instructs federal agencies to identify environmental effects in "adequate detail" so that they can be given equal consideration with economic and technical factors associated with a project. The GMUG initiated a study of the distribution and condition of fen wetlands on the Forest in 2008 as a direct response to concerns of the Environmental Protection Agency about the impact of enlarging Hunter Reservoir on a fen wetland at the site. The report, *Inventory of Fens in a Large Landscape of West-Central Colorado*, was published, following professional peer review, in April 2012. The results of and insights from that study, along with information from other studies (e.g., Austin and Cooper 2015) are used in this analysis to evaluate potential adverse environmental effects of all alternatives as well as wetland-specific mitigation activities associated with them.

Chapter 2. Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Monument #1 and Hunter Reservoir Enlargement Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (e.g., enlarging an existing dam versus constructing a new dam) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (e.g., habitat lost as a result of an enlarging an existing reservoir versus constructing a new reservoir).

Alternatives Considered in Detail

Alternatives 1 and 2 include a variety of actions in addition to reservoir enlargement (Table 2). Alternatives 1 and 2 would include design features and best management practices to protect the surrounding natural environment during construction and after the completion of the construction phase of the project (Appendix A).

Table 2. Summary of actions associated with Alternatives 1-3.

Action	Alternative 1	Alternative 2	Alternative 3
NFSR 262 Improvement	Yes	Yes	No
NFST 518 Improvement, re-route	Yes	Yes	No
NFSR 280 Improvement, re-route	Yes	No	No
Leroux Creek Snowmobile Trail re-route	Yes	No	No
Monument #1 Enlargement	Yes	Yes	No
Hunter Reservoir Enlargement	Yes	No	No
Transfer Monument #2 water right to Monument #1	Yes	Yes	No
Decommission Monument #2 Reservoir	Yes	Yes	No

Alternative 1

Road Improvements: NFSRs 262, 280

The 11-mile access route from Vega Reservoir to Hunter Reservoir includes two National Forest System Roads (NFSR): NFSR 262, from Vega Reservoir along Leon Creek to the confluence of Leon Creek and East Leon Creek, and NFSR 280, along East Leon Creek to Hunter Reservoir (Figure 2). Both roads are currently high clearance, four-wheel drive roads with frequent stream and wetland crossings. In order to allow passage of the heavy equipment needed to construct the dam and the trucks that would carry crushed rock, cement or concrete and other material to the work site, substantial improvements to the roads would be required in the last six miles of the route.

Approximately three miles south of the Forest boundary in an area that has historically been used as an ATV unloading site, a “transfer area” would be established along NFSR 262 (Figure 2). The area is prone to flooding, which results in rutting and other resource damage. The area would be graded, sloped and hardened to allow for use of the site, while protecting or improving the condition of the surrounding area. The transfer area would be used for construction activities at both reservoir sites and would remain as a parking area following construction.

Road improvements along NFSR 262 include leveling steep approaches to crossings, improving drainage, removing dips and bumps, enlarging stream crossings, and relocating portions of the road out of wetlands. Culverts would be placed at several stream crossings.

Due to lack of maintenance, much of NFSR 262 has a footprint that is more than 30 feet wide. The road would be narrowed to a width of 14 feet with appropriate drainage and mutually visible pullouts. Drainage would be established along the road, creek crossings would be hardened, and surface rock applied in order for the road to accommodate the increased traffic associated with the larger, heavier vehicles needed for construction of the reservoir enlargements. The road would be upgraded to the transfer area to allow passage by two-wheel drive vehicles. From the transfer area on to the reservoir sites, NFSR 262 would be used by off-road equipment and trucks, which would require less work on the road. The intent of the road upgrades would be to improve the road structure and stability and not to allow for increased vehicle speeds.

Road improvements to NFSR 280, Alternative 1 only, would be similar in scope and scale to those made along NFSR 262 (see above). A 200-foot section of NFSR 280 is located in a wetland near Hunter Reservoir and cannot be moved. This road section will be reconstructed using geotextiles, log corduroy, rock drainage and other techniques appropriate to roads located in wetlands. After construction, roadways would be allowed to return to their original condition naturally, a process that would occur over several years and not require active restoration by Ute Water or the Forest Service. Sections of roads relocated out of wetlands would remain in their new upland locations. Over time the roads and trails accessing Monument #1 Reservoir and Hunter Reservoir will return to their present condition providing access to four-wheel drive vehicles and UTVs.

Approximately the last mile of NFSR 280 would be relocated permanently to an upslope area in order to remove stream crossings and eliminate direct impacts to the stream and riparian area (Figure 3). The previous alignment would be obliterated and wetland areas restored. The new road would approach Hunter Reservoir through uplands west of East Leon Creek. The final alignment of NFSR 280 would be approved by the Forest Service prior to construction. The new road would be a Forest Service Traffic Service Level D, with a running surface 14 to 16 feet wide and an average corridor width, including the road, of 22 feet. The road would have native material surfaces with drainage structures and roadbed stabilization features.

A commercial cattle guard would be installed and approximately 1 mile of fence relocated at the junction of NFSR 127, NFSR 280, and NFST 730 (Figure 2). The cattle guard will replace two gates that must be opened and closed by motor vehicle users.

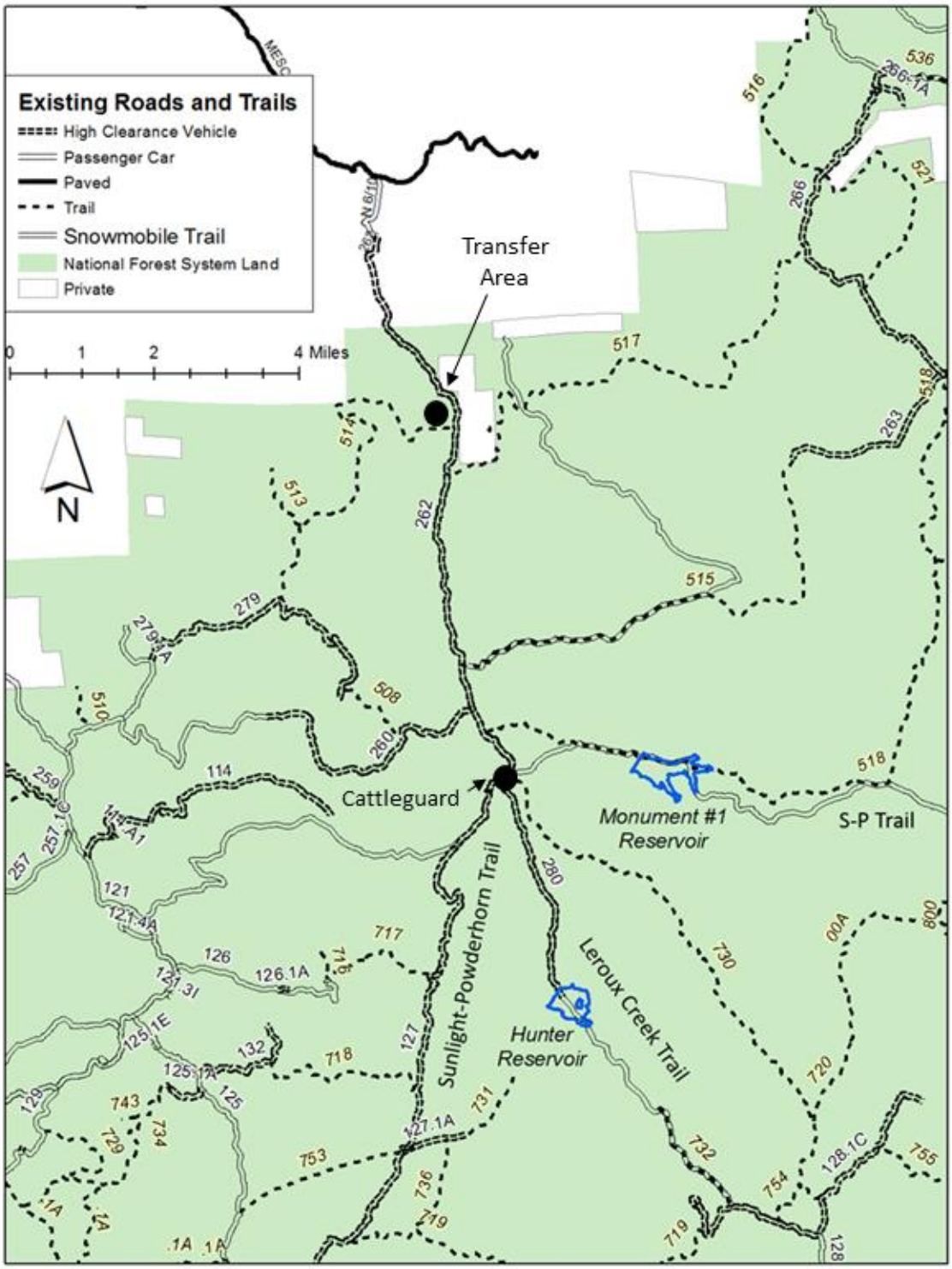

Figure 2. Roads and trails in project area.

Trail Improvements: NFST 518, Leroux Creek Snowmobile Trail

Portions of NFST 518 are located in or adjacent to wetlands, making part of the trail unsuitable for construction traffic. Several portions of NFST 518 would be relocated and widened to accommodate construction vehicles and equipment (Figure 4). Following reservoir construction, the route would be narrowed to a point that will accommodate administrative access by Ute Water staff but public access to Monument #1 Reservoir will be restricted to UTVs less than 50 inches wide.

An enlarged Monument #1 Reservoir would inundate portions of NFST 518 and the Sunlight-Powderhorn snowmobile trail. Approximately 1.5 miles of NFST 518 starting at the current dam will be relocated north of the enlarged reservoir footprint. Additionally, approximately 4 miles of the Sunlight-Powderhorn (S-P) Snowmobile Trail will be relocated outside the reservoir footprint (Figure 5). The new trail would intersect the S-P Trail upstream of Monument #1 Reservoir. This trail is part of a popular 40-mile-long groomed trail system, and the new alignment would need to be cleared about 22 feet wide in order to accommodate a trail groomer.

Under Alternative 1 only, a portion of the Leroux Creek Snowmobile Trail would be inundated by an enlarged Hunter Reservoir. The Leroux Creek Trail is popular and the trail is groomed throughout the winter. About one mile of the existing Leroux Creek Snowmobile Trail would be rerouted (Figure 6). The new alignment would be cleared 22 feet wide in order to accommodate a trail groomer.

Road maintenance along NFSR 262 and NFST 518 (and NFSR 280 for Alternative 1) would be the responsibility of Ute Water during reservoir enlargement. A road improvement plan detailing improvements, re-routes, and maintenance would be submitted by Ute Water for approval by the Forest Service 30 days in advance of work. Following completion of construction the Forest Service will resume responsibility for road and trail maintenance.

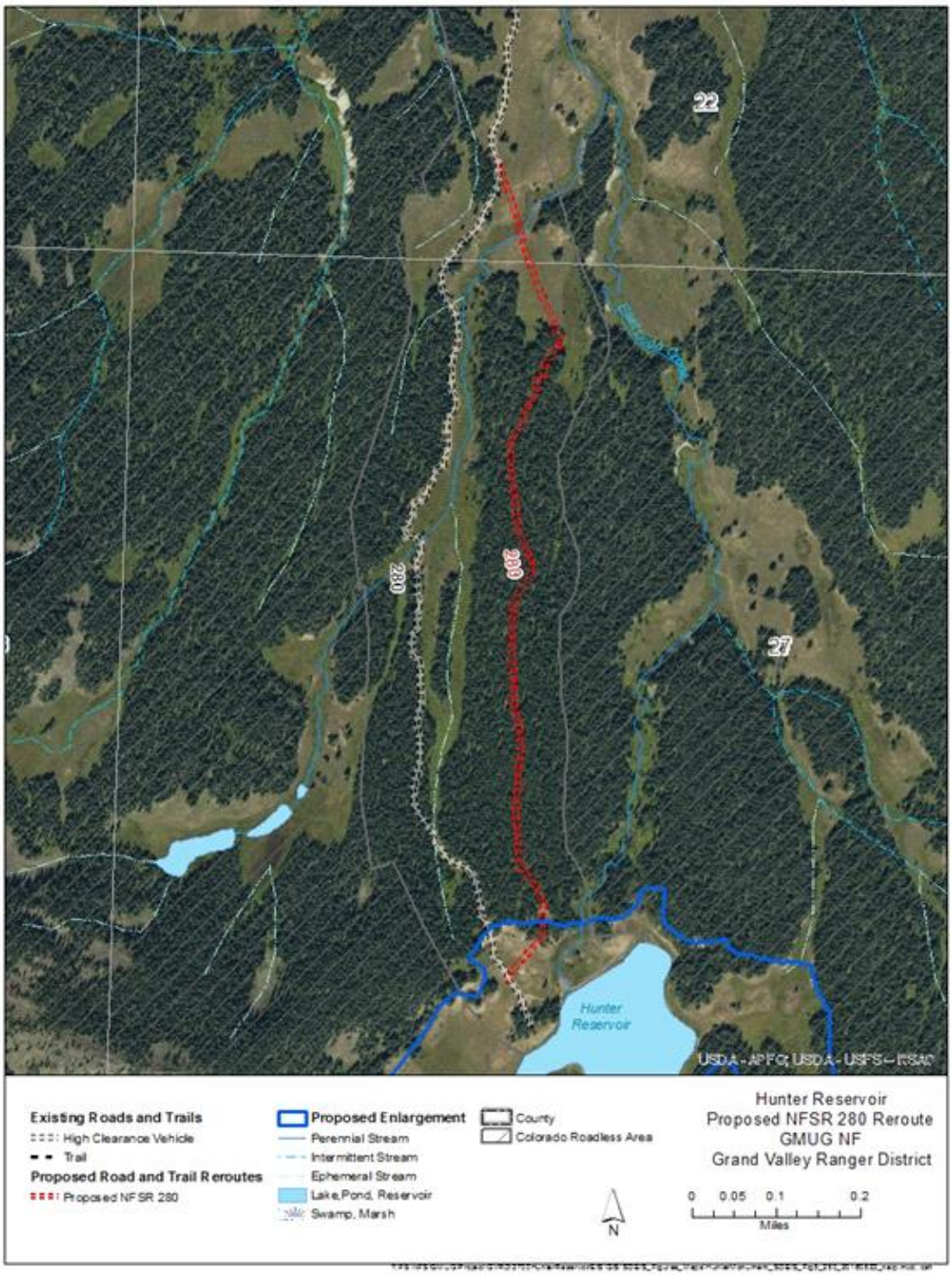

Figure 3. Proposed re-route of NFSR 280 along East Leon Creek, downstream from Hunter Reservoir.

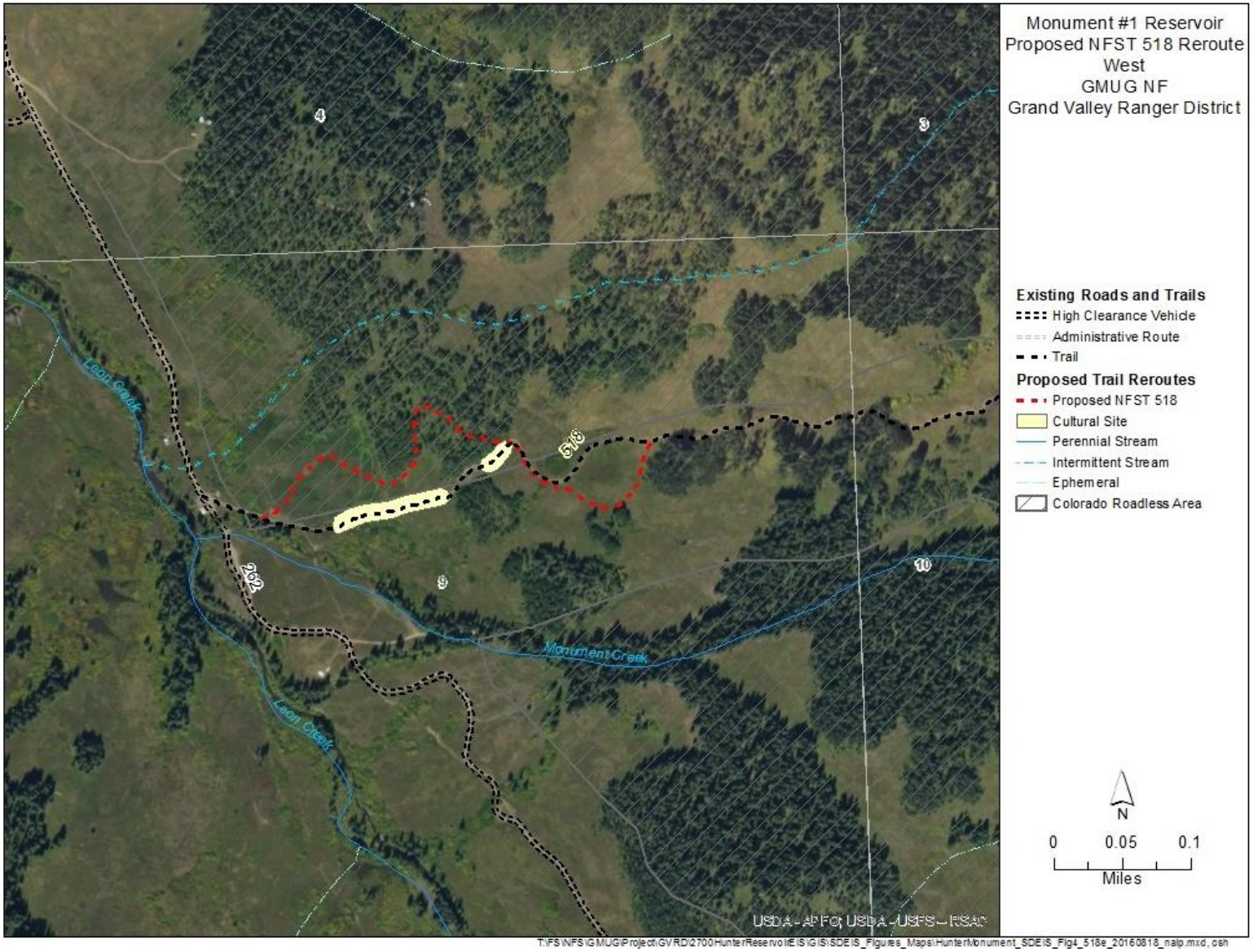

Figure 4. Proposed re-route of NFST 518 near the confluence of Leon Creek and Monument Creek.

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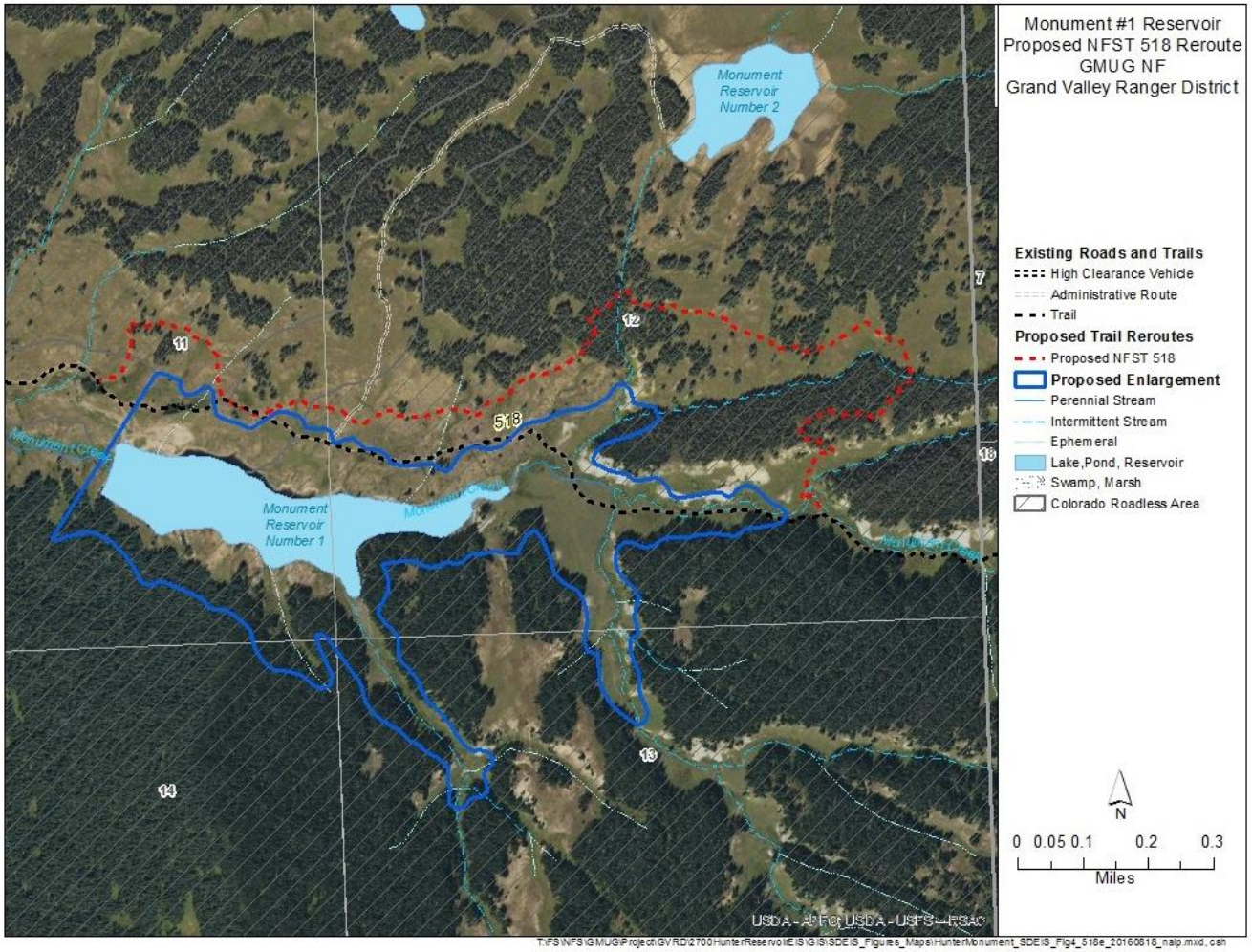

Figure 5. Proposed re-route of NFST 518, the Sunlight-Powderhorn snowmobile trail around an enlarged Monument #1 Reservoir.

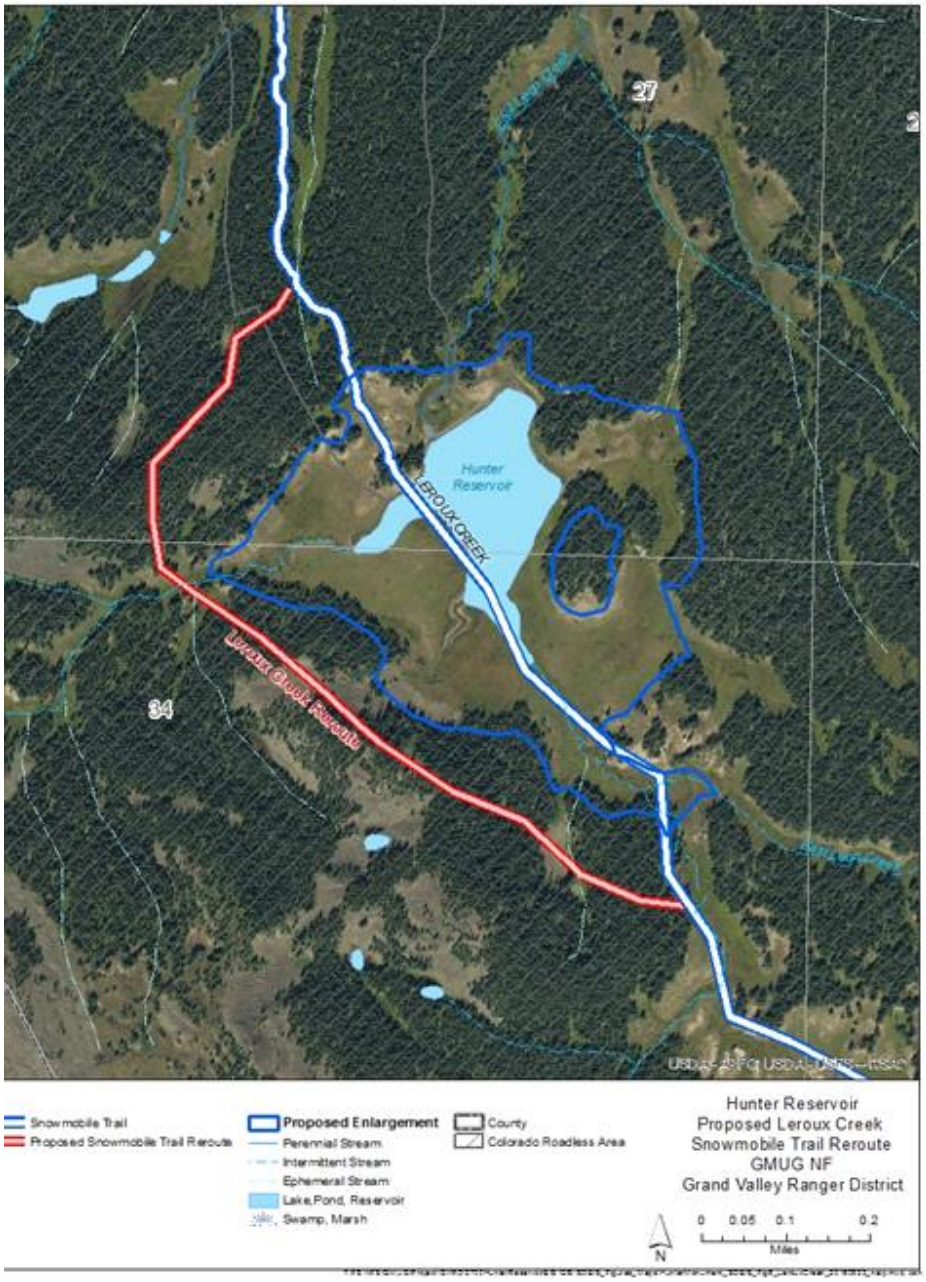

Figure 6. Proposed re-route of Leroux Creek snowmobile trail around an enlarged Hunter Reservoir

Dam Construction

For both alternatives, a temporary workers' camp would be located near the construction site to reduce construction traffic and improve construction efficiency. The site would need to be large enough to

accommodate 6 to 10 camp trailers for the 15-20 workers and 5-6 trucks that would remain on-site. The camp could be located either at the reservoir site or on an old well pad near the intersection of NFSR 262 and NFST 518. Heavy equipment, including bulldozers, track hoes, road graders, and compactors would be stored near the construction site. Temporary sanitation services would be maintained at the camp. The camp would be used during the entire construction phase. A temporary special use permit will be required for the workers' camp and associated facilities.

Monument #1 Reservoir

For Alternative 1 Ute Water would enlarge the existing Monument # 1 Reservoir by increasing the size and height of the dam and spillway and expanding the water storage capacity of the facility from the current 446 acre-feet to 5,267 acre-feet. The current inundated area covers approximately 37.9 surface acres and would be increased to about 155.3 acres following construction. The proposed enlarged dam would increase the vertical height to 80 feet with a dam crest elevation at 10,263 feet. The new crest width would be 25 feet and the crest length would be about 1,810 feet. The preliminary embankment design concept assumes a zoned earthen embankment with a 3:1 downstream slope and a 3.5:1 upstream slope. The new dam would include an emergency spillway on the right abutment. See Table 1 for additional details regarding an enlarged Monument #1 Reservoir.

The soils beneath the enlarged embankment dam consist of deposits of glacial till overlying Uinta Formation siltstone, sandstone, and claystone. The proposed enlarged embankment would be constructed using material drawn from on-site borrow areas. The upstream slope of the dam would be surfaced with granular riprap and materials to protect against wave erosion. Riprap material, sourced from basaltic talus located throughout the reservoir, would be processed on-site.

A compacted clay core centrally located within the embankment would act as a barrier to seepage. The clay core would extend from the limits of foundation improvements (grout curtain) to the proposed normal water surface elevation of 10,258 feet. It is intended to minimize seepage, reduce pressure on the dam itself, and eliminate the soft soil conditions identified on the downstream toe of the embankment. The material necessary to construct the clay core exists within the reservoir footprint as identified during the geotechnical evaluation (URS 2011). A cutoff trench located beneath the clay core of the dam and consolidation grouting of this zone may be required.

The enlarged dam would have an internal drainage system. The principal elements of the drainage system would include the filter and chimney drain immediately downstream of the clay core and the blanket drain constructed horizontally downstream of the central clay core along the footprint below the embankment shell. Toe drain collection piping would be constructed along the toe within the blanket drain to convey seepage safely through the embankment for monitoring and measurement. Materials necessary for construction of the internal drainage system are available locally from the Grand Valley area and would need to be transported to the site.

The outlet works and service spillway tower would be constructed of concrete, positioned near the upstream toe of embankment, and founded in strong, competent materials to prevent settlement. An access bridge would connect the tower to the dam crest for operation and maintenance equipment and personnel. The outlet works pipe would be sized as necessary to accommodate dam safety requirements for emergency drawdown or as necessary for the safe diversion of storm inflows during construction. The service spillway crest would establish the normal water surface elevation of the reservoir at 10,250 feet and would pass excess water up to the 100-year recurrence interval down the outlet works conduit into an energy-dissipating basin below the downstream face of the dam.

An emergency spillway will be located in a topographic saddle approximately 850 feet north of the right abutment. Releases from the emergency spillway in excess of the 100-year storm event would enter Monument Creek through an adjacent drainage approximately 500 feet downstream of the enlarged dam. Locating the uncontrolled releases from the emergency spillway away from the embankment is an important dam safety upgrade. The emergency spillway crest length and control sill elevation would be constructed based on the determination of the inflow design flood hydrology performed in accordance with the Colorado State Engineer's Dam Safety requirements.

Most of the materials for the construction would be derived, wherever possible, from the borrow areas and the nearby basalt talus within the reservoir footprint to minimize haulage distance, create additional reservoir storage, and minimize disturbed area. In addition to the imported material necessary to construct the drainage collection system (crushed rock, sand), concrete materials including aggregate, cement, and admixtures will be delivered for on-site batching. Road-surfacing and other materials as necessary for access improvements may be brought to the site from the Grand Valley area.

Because of the short construction season, construction could take 3-4 years. The first season would be used to improve access roads, develop borrow areas, stockpile embankment materials, import drainage materials, remove the existing dam, begin foundation grouting (if required), and establish the coffer dam, outlet works, and flood bypass structures. During the second season, construction of the outlet works and service spillway tower could be completed and embankment fill would begin. The remaining seasons would entail completion of the embankment, riprap placement, emergency spillway construction, and the access bridge to the tower.

All trees below 10,258 feet elevation surrounding the reservoir will be cleared prior to reservoir filling. Additional trees may need to be removed along NFST 518 and the Sunlight-Powderhorn Snowmobile Trail. This work is necessary to reduce debris in the reservoir which could block spillway channels and impact reservoir operations. Additionally decomposition of vegetation inundated by reservoirs produces greenhouse gases; therefore, vegetation removal will reduce, albeit minimally, the climate change "footprint" of the construction portion of the project. The estimated total area of tree removal is 25 acres.

The majority of construction and fill material for Monument # 1 Reservoir is available at the site. However, approximately 40,000 cubic yards of sand, gravel, stone and other construction material would need to be imported, requiring an estimated 3,001 round trips using 25-ton end-dump haul trucks for an average of about eight round trips per day during the period of construction.

Following construction, the dam at Monument #2 Reservoir, located northeast of Monument #1 Reservoir, would be breached, water control structures (outlet, concrete walls, etc.) would be removed, and the area allowed to naturally vegetate. The existing access route used for operation and maintenance of Monument #2 Reservoir would be rehabilitated to the extent necessary, and the route closed to any use. The point of storage of the water right associated with Monument #2 Reservoir would be transferred to Monument #1 Reservoir.

Hunter Reservoir

The existing earthen dam impounding Hunter Reservoir would be rebuilt and increased in size, expanding the water storage capacity of the facility from the current 59 acre-feet to 1,340 acre-feet. The current inundated area covers approximately 20.2 surface acres, which would be increased to about 79.1 acres following construction (Table 1; Ute Water, 2017). An enlarged dam will have a vertical height of 37 feet with a crest elevation at 10,393 feet. The new crest width would be 18 feet and the crest length would be 1,312 feet. See Table 1 for additional information regarding an enlarged Hunter Reservoir.

The new reservoir would require two saddle dams: the west saddle dam, an embankment located immediately west of the new dam, and the east saddle dam, located in a topographic saddle 600-700 feet east of the new dam. The saddle dams would have vertical heights less than 20 feet and crest lengths less than 570 feet.

The soils beneath the enlarged embankment and the two saddle dams consist of glacial till overlying Uinta formation sandstone and claystone. The proposed saddle dams and enlarged embankments would be constructed using material drawn from on-site borrow areas that would ultimately be inundated. The upstream slope of the dam would be surfaced with a layer of riprap comprised of basalt boulders. The riprap would be taken from basaltic talus located just south of the reservoir and processed on-site. A new outlet works would include replacement of the existing 18-inch outlet conduit with a 24-inch conduit.

A clay blanket cutoff, consisting of a 3-foot-deep layer of clay soils that acts as a barrier to seepage, would be located on the face of the dam upstream of the existing embankment. The cutoff would extend into the bedrock or to an elevation of 10,314 feet, whichever is reached first. It is intended to minimize seepage, reduce pressure on the dam itself, and eliminate the soft soil conditions identified on the downstream toe of the embankment.

The new dam would have two spillways, a replacement service spillway and a new emergency spillway. The new service spillway would control normal pool and pass routine floods downstream. Set in the west saddle dam, the service spillway would establish a pool at 10,388 feet elevation and would pass excess water down a conduit into an impact basin below the face of the dam. The emergency spillway will be located in a topographic saddle about 1,600 feet southeast of the dam, with a concrete control beam at 10,389.5 feet elevation, 1.5 feet above normal pool. The emergency spillway is set away from the main embankment to discharge floodwater into a drainage basin just east of East Leon Creek, preventing erosion of the dam resulting from overtopping.

The enlarged dam embankment would have an internal drainage system to reduce pore pressures and to prevent internal erosion of embankment and foundation materials. The principal element of the drainage system would be toe drains in the embankment and the saddle dams to collect and convey seepage flows to the downstream side of the embankments. The toe drains would be 4-inch drainpipes surrounded by filter material. A bypass ditch allow streamflow passage during the construction phase.

Most materials for the construction would be derived from the borrow areas and the nearby basalt talus described above. However, road surface gravels and filter drain materials (crushed rock and sand), as well as cement, would be delivered to the site. Concrete would probably be mixed and placed on site. Because of elevation and snow cover, the season during which construction activities will take place is short, from July until late September. The short construction season means that dam enlargement and construction of associated features would require three summers for completion.

All trees below 10,388 feet elevation in areas that would be inundated would be cleared and the slash disposed of, per Forest Service instructions, prior to filling of the reservoir in order to reduce debris in the reservoir and the potential for blocking spillways. Construction of the new access road would also require the removal of about 9 acres of trees.

The majority of construction and fill material for Hunter Reservoir is available at the site. However, approximately 14,415 cubic yards of sand, gravel, stone and other construction material would need to be imported from a commercial source, requiring approximately 8 trips per day during the construction phase for a total of approximately 1,056 round trips.

Table 3. Summary of disturbance associated with Alternative 1.

Habitat Type	Disturbance (acres)
Hunter Reservoir	
Grass-Forb-Shrub	67.4
Spruce-Fir	15.3
Riparian	14.3
Rock	1.8
Total	98.8
Monument #1 Reservoir	
Grass-Forb-Shrub	81.9
Spruce-Fir	15.9
Riparian	16.4
Total	114.2
Grand Total	213.0

Alternative 2- 6,598 acre-feet Monument #1 Reservoir (Agency Preferred Alternative)

Road and Trail Improvements

Road and trail improvements to NFSR 262 and NFST 518 would be the same as described for Alternative 1 above. Improvements to NFSR 280 and a re-route of the Leroux Creek Snowmobile Trail would not be necessary under Alternative 2; however, improvements that would benefit riparian wetlands and cultural resources along NFST 280 could be used as compensatory mitigation by Ute Water.

Dam Construction

Ute Water would increase the height and size of Monument #1 Dam in order to expand the water storage capacity of the facility to approximately 6,598 acre-feet. The current reservoir footprint is 37.9 acres and would increase to approximately 177 acres.

Details of dam construction are assumed to be identical to those for Alternative 1 (see above); however, the dimensions of an enlarged Monument #1 Dam would be different (Table 1).

Alternative 3- No Action

A No Action alternative implies the Forest Service would not authorize construction activities associated with Alternatives 1or 2. Ute Water would not be able to store a portion of its anticipated future water demand at the Hunter or Monument #1 sites. Proposed mitigation activities, including road maintenance and re-location, wetlands-restoration activities, an instream flow from Hunter Reservoir would not occur at this time. Existing water rights and water use would continue.

Compensatory Mitigation

This project will result in environmental impacts. Compensatory mitigation will be required for wetlands impacts as the analysis in Chapter 3 concludes that there will be a net loss of wetlands associated with the project (Table 29, page 101). Compensatory mitigation may be required for other resource areas; however, the Forest Service has endeavored to use Design Criteria (Appendix 1) in order to prevent or minimize impacts to other resource areas.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14).

Three NEPA-driven analyses completed between 1998 and 2012 included alternatives to enlarging Hunter Reservoir. The first of these was the BLM's analysis of Ute Water's replacement of the Plateau Creek Pipeline in which the BLM considered 10 alternatives (BLM 1998). In the 2007, Draft EIS for Ute Water's application to enlarge Hunter Reservoir, the Forest Service considered nine alternatives. Lastly, the Corps completed a LEDPA analysis, as prescribed by Clean Water Act regulations, in 2012, that included 29 alternatives to enlarging Hunter Reservoir. Each of those analyses included alternatives that are relevant to Ute Water's current proposal to enlarge both Monument #1 Reservoir and Hunter Reservoir. Alternatives to the construction of the reservoirs in the proposed action include 1) finding another water source (e.g., groundwater or purchase of existing water rights); 2) building a reservoir at one or more alternative sites; 3) enlarging one or more existing reservoirs not included in the proposed action; and 4) reducing demand (e.g., increased water conservation by end users). These four categories constitute the full range of possible alternatives to the proposed action.

The GMUG also considered environmental impacts described in Section 404 of the Clean Water Act to identify potential environmental impacts of each of the alternatives described below. Section 404 of the Clean Water Act describes 16 types of environmental impacts that could result from projects associated with waters of the United States. The results of the analysis (available in the project record) showed that new reservoir construction had the highest potential for environmental impact and alternative water sources had the lowest potential for environmental impact. The alternatives analyzed in detail in this document had the potential to result in intermediate environmental impacts.

Alternative Water Sources

Alternatives that would use water from a source that would not require construction or enlargement of a reservoir were analyzed by the Forest Service in 2007 and the Corps in 2012 (Table 4).

Table 4. Alternative water sources.

Alternative	Comments
Groundwater use	Geo-technical investigations demonstrated the volume of water does not exist to make this a viable alternative (G.A. Miller and Associates, 1997).
Purchase and conversion of agricultural water in Vega Reservoir	Alternative would include purchasing and converting agricultural water rights in Plateau Creek watershed to municipal use. No interested irrigation water rights owners have been identified; there is an unknown volume of water available; and alternative has potential effects to agricultural economy in Collbran area. This alternative is speculative because there is no evidence Ute Water could obtain any agricultural water rights from current water users.
Purchase and conversion of agricultural water in Plateau Creek Valley	Purchase and convert agricultural water rights in Plateau Creek watershed to municipal use (commonly known as "buy and dry"). No interested irrigation water rights owners have been identified; there is an unknown volume of water available, and alternative has the potential to affect agricultural economy in Collbran area. This alternative is speculative because there is no evidence Ute

Alternative	Comments
	Water could obtain any agricultural water rights from current water users.
Increased use of Colorado River water	There are Endangered Species Act (ESA) issues related to listed aquatic species and Clean Water Act (CWA) issues associated with permitting an alternative that would further affect habitat for ESA-listed species. Ute Water does not currently hold the necessary water rights and any they may be able to acquire would likely be junior rights. The over-allocated Colorado River system may not be a consistent source of water and may not offset need for additional water storage. Lack of control of available volume and lack of permanent storage mean this alternative does not meet the purpose and need of the project. Lower water quality of Colorado River water makes this alternative undesirable from a water quality standpoint for a municipal supply.

Ute Water's proposal to enlarge one or more reservoirs in the Leon Creek watershed is based upon a need to develop a relatively stable source of water to be used during times of drought. High-elevation reservoirs accomplish this by storing a known quantity of water until it is needed. Geo-technical investigations have shown that there is not sufficient groundwater to meet the project's purpose and need. With respect to acquisition of agricultural water rights in Vega Reservoir or the surrounding Plateau Valley, there are no known water users who have expressed interest in selling their water rights to Ute Water and there appears to be no way Ute Water could compel water users to sell their water rights.

Increased use of Colorado River water has the potential to be a viable alternative based on the potential for a sufficient volume of unallocated water in the river. However, unallocated Colorado River water would only be available in springtime, not during drought conditions when Ute Water would theoretically access water stored in surface reservoirs. Implementing an alternative based on run-off from the Colorado River would likely necessitate the construction or enlargement of a storage facility. A second limitation of this alternative is the volume of unallocated water in the Colorado River varies each year and it is possible approximately 6,600 acre-feet of water would not be available every year, particularly in drought years. Uncertainties in the timing and volume of available water in the Colorado River mean this alternative does not meet the purpose and need of this project.

New Reservoir Construction Alternatives

Twelve alternative reservoir construction sites have been proposed over the 12-year history of this project. The range of new reservoir alternatives includes facilities that would store relatively small amounts of water as well as a regional storage facility on par with existing giant reservoirs on the lower Colorado River (Table 5). Most of the proposals describe on-channel reservoirs but a regional storage facility could presumably be located at an off-channel site.

Table 5. New reservoir construction alternatives.

Alternative	Volume	Comments
West Fork East Leon Creek	52	This alternative would represent less than 1 percent of Ute Water's storage need.
West Middle Leon Creek	1,269	On-channel reservoir that would store approximately the same amount of water as enlarged Hunter Reservoir. Water yield analysis at this site suggests surrounding watershed

Alternative	Volume	Comments
		would not yield sufficient volumes of water to meet purpose and need. A trans-basin diversion, therefore, would be required resulting in impacts to multiple stream channels.
East Fork East Leon Creek	1,326	This alternative is an on-channel reservoir that would store approximately the same amount of water as enlarged Hunter Reservoir. This site would require road construction inside a Roadless Area.
East Leon Creek	1,354	This alternative is an on-channel reservoir that would store approximately the same amount of water as enlarged Hunter Reservoir, at a downstream location. This alternative would require road construction within a Roadless Area and the importation of all dam fill material. In 2008, Ute Water estimated the cost of this alternative at $31,000,000, about six times the cost of enlarging Hunter Reservoir.
Upstream of Hunter Reservoir	1,367	This alternative is an on-channel reservoir that would store approximately the same amount of water as enlarged Hunter Reservoir. Geologic instability at this site necessitates a concrete, rather than earthen, dam. Water yield analysis at this site suggests surrounding watershed would not yield sufficient volumes of water to meet purpose and need. A trans-basin diversion, therefore, would be required resulting in impacts to multiple stream channels.
Smaller Big Park Reservoir	1,385	This alternative is an on-channel reservoir that would store approximately the same amount of water as enlarged Hunter Reservoir. Preliminary geo-technical investigations reveal geologic instability at this site that could render the site unsuitable for reservoir construction. Under certain climate change scenarios this lower-elevation site could transform from a snow-driven to rain-driven precipitation patterns, which could complicate reservoir operations and create dam safety issues in response to rain events in the winter and spring. Unlike proposed action, this alternative would require new road construction inside a Colorado Roadless Area. This alternative would require a trans-basin diversion from nearby Park Creek. Poor site suitability, the need to construct roads in Roadless Areas, as well as the need for a trans-basin diversion render this alternative infeasible and unreasonable.
Big Park Reservoir	5,470	This alternative is an on-channel reservoir that would store approximately the same amount of water as enlarged Monument #1 Reservoir. Preliminary geo-technical investigations reveal geologic instability at this site that could render the site unsuitable for reservoir construction. Under certain climate change scenarios this lower-elevation site could transform from a snow-driven to rain-driven precipitation patterns, which could complicate reservoir operations and create dam safety issues in response to rain events in the winter and spring. This alternative would require new road construction inside a Colorado Roadless

Alternative	Volume	Comments
		Area. This alternative would require a trans-basin diversion from nearby Park Creek. Poor site suitability, the need to construct roads in Roadless Areas, as well as the need for a trans-basin diversion render this alternative infeasible and unreasonable.
Buzzard Creek	16,800	This alternative is an on-channel reservoir that would store nearly three times the water volume identified in the proposed action. Proposed reservoir would inundate 11 parcels of private land and there is no indication private landowners are interested in selling their property to Ute Water. Given the Forest Service's core mission to provide clean water for human use and Ute Water's possession of valid Colorado water rights on Forest Service lands, this alternative is highly speculative and therefore unreasonable.
Atwell Gulch	19,400	This alternative is an on-channel reservoir that would store over three times the water volume identified in the proposed action. Proposed reservoir would inundate private land parcels and public lands administered by the BLM. No landowners have been identified as interested in selling their property to Ute Water. BLM lands support ESA-protected species and BLM identifies Atwell Gulch as an Area of Critical Environmental Concern (USBLM 2015). BLM lands in the area are closed to motorized and mechanized travel and grazing and the area is identified as important for Bighorn Sheep. Alternative is highly speculative with species impacts that render this alternative unreasonable.
Owens	22,000	This alternative is an on-channel reservoir that would store over three and a half times the water volume identified in the proposed action. Ute Water does not possess conditional water rights for the location. Four private land parcels would be inundated at this location and no landowners identified as interested in selling their property to Ute Water. Alternative is highly speculative and unreasonable.
Regional facility	Unknown	This alternative is a proposed reservoir, which would store many times Ute Water's proposed water volume. A reservoir would presumptively be located on the Colorado River, Gunnison River, Plateau Creek, Roan Creek, or the Dolores River, downstream of the Plateau Creek Pipeline and would require additional new water delivery or water treatment infrastructure. A large reservoir would result in an undetermined amount of environmental damage and would likely be opposed by a diverse array of stakeholders. Cumulative impacts to large river (or, in the case of an off-channel reservoir, a terrestrial ecosystem) ecosystem would be significant. At this time this alternative is highly speculative. Increased evaporation rates at relatively low-elevation site as well as the possibility this facility would not service the Plateau Creek Pipeline means this alternative

Alternative	Volume	Comments
		does not meet the project's purpose and need. Uncertainties related to location, Ute Water's ability to dictate operation, and probable environmental impacts mean this alternative is neither practicable nor reasonable.
Underground storage	Unknown	Technology exists, but geology and chemistry beneath Plateau Creek may not allow sufficient quantities to be stored to offset need for surface water storage. Water delivery and injection infrastructure could damage terrestrial ecosystems. Geology and chemistry are likely to impact stored water quality negatively. Lack of sufficient storage and potential adverse impact to water quality mean this alternative does not meet the purpose and need of the project.

Generally, constructing one or more new reservoirs when options exist to enlarge existing facilities is inconsistent with Section 230.70(f) of the Clean Water Act's 404(b)(1) guidelines. Additionally, in some cases, new facilities would require construction of new roads within Roadless Areas. While the Colorado Roadless Rule has exceptions for water storage facilities for water rights existing prior to July 3, 2012, this does not apply to all alternatives and options exist to enlarge existing facilities that would not result in the level of environmental impact caused by a new reservoir (see Environmental Impacts Based on Clean Water Act 404(b)(1) Guidelines section below).

In an April 26, 2017 letter to the Forest Service, the Corps of Engineers suggested analyzing three new reservoir alternatives, Buzzard Creek, Atwell Gulch, and Owens, based on down-sized reservoirs that would store approximately 6,600 acre-feet of water. The Corps' rationale was that smaller reservoirs at these locations may result in less impact to aquatic ecosystems than Alternatives 1 and 2, presented in this document. Reservoir size doesn't nullify the potential environmental impact of a new reservoir in a previously un-impounded watershed (see Environmental Impacts Based on Clean Water Act 404(b)(1) Guidelines section below).

Existing Reservoir Enlargement Alternatives

The multi-year analysis of Ute Water's proposal to enlarge Hunter Reservoir included consideration of enlargements of eight other reservoirs (Table 6). For the purposes of comparison, Hunter Reservoir and Monument #1 Reservoir are included in Table 6.

Table 6. Existing reservoir enlargement alternatives.

Alternative	Volume	Comments
Alternatives Analyzed in Detail (for comparison)		
Hunter Reservoir, Alternative 1	1,340	This is the reservoir enlargement project included in Alternative 1 of this document.
Monument #1 Reservoir, Alternative 1	5,267	This is the reservoir enlargement project included in Alternative 1 of this document.
Monument #1 Reservoir, Alternative 2	6,598	This is the reservoir enlargement alternative included in Alternative 2 of this document.
Additional Reservoir Enlargement Alternatives		
65-acre-foot Hunter Reservoir	65	Storing approximately 47 acre-feet of additional water at the Hunter Reservoir site is less than 1 percent of the water volume in Ute Water's proposed action. The intent of the small enlargement is to not inundate the remaining portion of

Alternative	Volume	Comments
		a fen wetland near Hunter Reservoir. The small volume of the enlargement would necessitate at least one additional reservoir construction or enlargement. The small size means this alternative does not contribute in a meaningful way to meet the purpose and need of the project.
Jensen Reservoir	74	This enlargement would store about 1 percent of the water volume in Ute Water's proposed action. Would require the construction or enlargement of at least one additional facility with unknown environmental effects. According to wetlands experts this site has a large remnant peat mat and a high probability of successful fen restoration. The small size means this alternative only meets a small fraction of water demand.
Monument #2 Reservoir	453	Enlargement would store approximately 8 percent of Ute Water's need and would require the construction or enlargement of at least one additional facility. According to wetlands experts this site has a remnant peat mat and a high probability of successful fen restoration. The small size means this alternative does not meet the purpose and need of the project.
Colby Horse Park Reservoir	1,101	The site failed a water yield test and may not be able to provide the volume of water on a consistent basis. In that case a trans-basin diversion would be necessary. Inability to refill the reservoir following water use means this alternative does not meet the project purpose and need.
Kenney Creek Reservoir	1,350	Storing additional water at this facility would conflict with senior water right holders at the existing facility. The site failed a water yield test and may not be able to provide the volume of water on a consistent basis. In that case a trans-basin diversion would be necessary, which makes this alternative potentially more environmentally damaging than Alternatives 1 or 2.
Leon Lake Reservoir	1,380	The entire volume of this watershed is diverted to the south side of the Grand Mesa. There isn't sufficient water to store 1,380 AF at this site, therefore a trans-basin diversion would be necessary. Inability to refill reservoir following water use means this alternative does not meet the project purpose and need.
Vega Reservoir	≥ 6,600*	This highly speculative alternative would presumably result in the same volume of water stored as the proposed action. It is unclear whether enlargement of Vega Reservoir is possible from a geologic and engineering standpoint. It is unclear whether Bureau of Reclamation or Congress would support an enlargement. Ute Water would not operate the facility nor would the facility be operated in a manner consistent with the purpose and need of this project. Ute Water's water right would be junior to other water rights in the facility, therefore, they would not be able to store their water in a manner consistent with their proposed reservoir operations.

Alternative	Volume	Comments
Jerry Creek Reservoir(s)	≥ 6,600*	According to Ute Water's engineering staff,** these reservoirs, which are created by two high-hazard dams and several levees, cannot be enlarged further. In addition, the geology of the site is unstable. The low-elevation location of these reservoirs means they are subject to greater evaporative water losses than reservoirs in proposed action. This is not a available, practicable, or reasonable alternative to the proposed action.

*Volume based on assumption that alternative would include the full water volume in the proposed action.

**Comments provided by David Priske, P.E., Ute Water Conservancy District, during a meeting on May 8, 2017.

Enlarging one or more existing high-elevation reservoirs would satisfy the project's purpose and need and numerous potential enlargements have been investigated over the long history of this project (Table 6). Numerous permutations of these alternatives would result in the high-elevation storage of more than 6,600 acre feet of water. In particular, two alternatives, Colby Horse Park Reservoir and Kenney Creek Reservoir, could store approximately the same amount of water as Hunter Reservoir. However, the contributing watersheds of these facilities are very small and Ute Water would not be able to refill these reservoirs in a timely manner after they accessed water to meet downstream municipal demands. In order to offset this, trans-basin diversions would be necessary in order to import additional water to these facilities and the appropriate infrastructure would have environmental impacts, to aquatic and terrestrial ecosystems, beyond those of facilities that have adequate water supplies in situ (see Environmental Impacts Based on Clean Water Act 404(b)(1) Guidelines section below).

Alternatives based on Reduced Water Demand

Reducing water demand by Ute Water's end-users was discussed during the BLM's analysis of the *Plateau Creek Pipeline Replacement Project* in the 1990s and again by the Forest Service in 2007 and the Corps of Engineers in 2012 (Table 7).

Table 7. Sources of reduced water demand.

Alternative	Comments
Increased water conservation	This alternative is unlikely to yield a significant volume of additional water and does not meet the purpose and need of Ute Water's proposal. The vast majority of Ute Water's customers use their water for domestic uses only (inside a home or office). This alternative does not meet the purpose and need of the project, which is store approximately 6,600 acre-feet of water in order to respond to drought situations.
Delivery system improvements	Ute Water completed several delivery system improvements in the last decade. Additionally, improvements are not likely to result in a significant amount of additional water. Because of the very small volume likely to result from additional improvements and on-going maintenance, this alternative does not meet the purpose and need of Ute Water's proposal. This alternative does not meet the purpose and need of the project, which is store

	approximately 6,600 acre-feet of water in order to respond to drought situations.

Reducing water demand, while a worthy objective, does not meet the purpose and need of this project. There is no evidence that any more than a small fraction of the more than 6,600 acre-feet exists as waste in delivery infrastructure or as waste by end users. Additionally, reduced water demand by existing water users would not obviate the need for additional water storage intended to meet the needs of Grand Junction's future population during times of drought.

Environmental Impacts Based on Clean Water Act 404(b)(1) Guidelines

The 404(b)(1) guidelines used by the Corps of Engineers to analyze permit applications directs the Corps to deny a permit application "if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, *so long as the alternative does not have other significant adverse environmental consequences* (emphasis added)." Subparts C, D, E, and F of Part 230 of the 404(b)(1) guidelines, define numerous potential environmental impacts associated with water development projects and other activities in or around aquatic ecosystems (Table 8). In the context of analyses required by both NEPA and the Clean Water Act it may be helpful to consider the potential for impacts listed in Table 8 to be manifested by the alternatives considered in detail as well as those dismissed from detailed consideration based on the analysis presented above. The following analysis is organized by specific sections of the 404(b)(1) guidelines that identify potential environmental impacts. The analysis identifies which alternatives presented in Tables 5-8 above are likely to result in each potential environmental impact.

Table 8. Potential environmental impacts identified in 404(b)(1) guidelines. Impacts defined in sections 230.25, 230.40, 230.42, 230.43, and 230.44 are not applicable to this project.

404(b)(1) Guideline	Description
230.20	Impacts to the substrate of an aquatic ecosystem, including alterations of substrate elevation, effects to bottom-dwelling organisms, and increased erosion.
230.21	Impacts to suspended particulates and turbidity, including increased turbidity, reduced visibility for sight-feeding aquatic life, and the mobilization of pollutants, such as heavy metals.
230.22	Impacts to water chemistry and quality including increased pollution and reduction of suitability for human consumption.
230.23	Impacts to water circulation, including obstructing flow and changes the dimensions of a water body.
230.24	Impacts to normal water fluctuations, including alterations of the water level in an affected area. Changes may lead to increased erosion, restriction of aquatic organism movement, and other habitat alterations.
230.30	Impacts to species protected by the Endangered Species Act, including direct mortality or alternation or destruction of habitat
230.31	Direct impacts to fish and other aquatic life.
230.32	Impacts to other wildlife, including terrestrial wildlife. This regulation applies to "resident and transient mammals, birds, reptiles, and amphibians."
230.41	Impacts to wetlands, one type of Special Aquatic Site.
230.45	Impacts to riffle and pool complexes, one type of Special Aquatic Site.
230.50	Impacts to municipal and private water supplies, including reduced water quality and suitability for human consumption.
230.51	Impacts to recreational and commercial fisheries, including chemical contamination and reduction of spawning habitat.
230.52	Impacts to water-related recreation.
230.53	Impact to aesthetics, including destruction of "vital elements that contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area."

230.54	Impacts to Parks, national monuments, wilderness areas, or similar preserves. The Forest Service considers Roadless Areas, designated by the 2012 Colorado Roadless Rule to fall under 230.54.

In addition to the 14 impact categories presented above, an evaluation of environmental damage should consider several parts of 404(b)(1) Section 230.70, which describes actions related to the location of discharge that are intended to minimize adverse effects (Table 9). Regulations presented in Table 9 are of particular importance in evaluating the relative environmental damage of enlarging existing reservoirs and building new reservoirs. The second part of Section 230.70(f), which applies to actions that would drain areas subject to normal water fluctuations, is valuable in evaluating the environmental damage of alternatives for which a trans-basin diversion would be necessary to fill a reservoir, for example, either alternative in which a new reservoir is built in Big Park (Table 6).

Table 9. Section 230.70 of the Clean Water Act's 404(b)(1) guidelines.

404(b)(1) Guideline	Description
230.70(a)	Locate and confine discharge to minimize smothering of organisms
230.70(b)	Designing the discharge to avoid a disruption of water inundation patterns.
230.70(c)	Selecting a site that has been used previously for material discharge.
230.70(f)	Minimize or prevent the creation of standing bodies of water in areas of normally fluctuating water levels and minimize the drainage of areas subject to such fluctuations.

The alternatives in Tables 4-7, including the proposed action and the Forest Service's preferred alternative, all have the potential to result in the impacts described in Tables 8-9. Potential impacts are discussed below.

230.20 – Impacts to substrate

Every new reservoir and reservoir enlargement described above is likely to have an effect on aquatic substrate. In fact, only groundwater use (Table 4) and the reduced water demand alternatives presented in Table 5 are unlikely to impact substrate. Dam enlargements are will inundate additional sections of stream channel. All new dam alternatives will have proportionally greater effects on substrate because previously unaffected stream channels will be impounded and inundated.

230.21 – Impacts to suspended particulates and turbidity

The only alternatives that are unlikely to have an effect on suspended particulates and turbidity are groundwater use and the reduced water demand alternatives presented in Table 8. All other alternatives involving alternative water sources (Table 4), new reservoirs (Table 6), and enlarging existing reservoirs (Table 6) will likely affect suspended particulates and turbidity in the short term. The use of additional Colorado River water (Table 4) is likely to have chronic impacts to turbidity and water clarity because of an annual reduction in discharge in the Colorado River as a result of this alternative. All new and enlarged reservoir-based alternatives are likely to result in the short-term elevation of suspended sediment and turbidity, associated with construction. Chronically elevated turbidity as a result of reservoir operations similar to that proposed for reservoirs described in Alternatives 1 and 2, has not been observed at other reservoir sites on the GMUG NF. It is unlikely, therefore, that chronic changes to suspended particulates and turbidity will result from any surface reservoir project described in Tables 5-6.

230.22 – Impacts to water

This section of the 404(b)(1) guidelines references impacts to water that result in its contamination or pollution. Additionally, contamination that reduces the suitability of water for aquatic life and human use is discussed in this section. The only alternatives that are likely to result in impacts consistent with Section 230.22 are the increased use of Colorado River water and underground storage of surface water. According to the U.S. Fish and Wildlife Service, any additional use of Colorado River water will jeopardize the four endangered Colorado River fishes (USFWS 1999), which seems to be an impact inconsistent with Section 230.22. Additionally, water quality in the Colorado is already poor compared to sources in the Plateau Creek drainage and Ute Water has expressed concern that greater use of Colorado River water would impact the quality of drinking water provided to their customers (Steve Ryken, Ute Water, personal communication).

Storing surface water in underground aquifers has the potential to supplant the need for surface water development. Underground storage has been explored as a possibility for this project and geotechnical investigations revealed that geology and chemistry in the aquifers below Plateau Creek could potentially contaminate water stored within them (USBLM 1998, references therein; USACE 2012). The extent of diminution of water quality resulting from underground storage is unclear; however, such an approach seems counterintuitive to the purposes of laws protecting human use of the environment, including NEPA, FLPMA, and the Clean Water Act. The potential exists for this alternative to result in impacts defined in Section 230.22, whereas it does not for all surface storage alternatives presented in Tables 4-6.

230.23 – Impacts to water circulation

Section 230.23 describes impacts that obstruct flow and change the dimensions of a water body. Based on these criteria, any new reservoir alternative, including off-channel reservoirs, would result in this impact whereas enlarging an existing reservoir would not. A new, on-channel reservoir would both obstruct flow and change the dimensions of the stream on which it is built. Alternatives that involve new water diversions, such as groundwater storage (Table 4) and the Big Park Reservoirs (Table 5), would both obstruct flow and change the dimensions of the stream downstream of the diversion. Therefore, in the context of Section 230.23, enlarging an existing reservoir is less environmentally damaging than new reservoir construction. It is also important to recognize that Alternatives 1 and 2 in this document would result in a net reduction in the number of reservoirs on national forest and remove impacts to water circulation and water fluctuations resulting from reservoirs at these sites. This is due to the fact that Ute Water has proposed decommissioning two reservoirs as mitigation for Alternative 1 and they have proposed decommissioning one reservoir as mitigation for Alternative 2. The removal of one or both of these reservoirs in concert with expanding an existing reservoir would result in restoration of more natural water circulation patterns in the watershed.

230.24 – Impacts to normal water fluctuations

Section 230.24 describes prolonged periods of inundation, habitat modifications, restrictions on aquatic animal movement, and changes to upstream and downstream areas. Any new reservoir construction alternative would have impacts to normal water fluctuations that exceed impacts resulting from any reservoir enlargement. This is due to the fact that impacts described in Section 230.24 are already occurring at existing reservoirs. Therefore, based on this criterion, enlarging an existing reservoir is less environmentally damaging than new reservoir construction. Alternative water sources (Table 4) may impact normal water fluctuation patterns. Increased conservation (Table 7) is unlikely to affect normal water fluctuations.

230.30 – Impacts to Threatened and Endangered Species

Fishes

The U.S. Fish and Wildlife Service concluded years ago that additional water depletions from the Colorado River will negatively impact the four Endangered Colorado River fishes (USFWS 1999). Using criteria included in Section 230.30, using additional Colorado River water would be more environmentally damaging to fishes than other alternatives presented in Tables 4-7.

Plants

The site at which a reservoir would be built at Atwell Gulch contains populations of several special status plant species including Uinta Basin Hookless Cactus, DeBeque Phacelia, and Debeque Milkvetch (USACE 2012). These populations could be lost if a reservoir was built at this location. Using criteria included in Section 230.30, building a reservoir at Atwell Gulch would be more environmentally damaging to plants than other alternatives presented in Tables 4-7.

Other wildlife

Enlarging Hunter and Monument #1 Reservoir will inundate habitat for Canada lynx. The Forest Service completed consultation for these impacts in 2016. The result of this consultation was a determination by the Fish and Wildlife Service that the combined impact of enlarging Hunter Reservoir and Monument #1 Reservoir on lynx would be minimal. It is likely the determination would be the same for other surface reservoir alternatives included in Tables 5-6. Alternatives presented in Table 4 and 7 are unlikely to affect ESA-protected wildlife species (see Terrestrial Wildlife Section below).

230.31 – Impacts to fish and other aquatic organisms

Increased use of Colorado River water (Table 5) is likely to negatively impact the four Endangered Colorado River fishes and this alternative would be the most environmentally damaging based on Section 230.31. There is no evidence that any of the other alternatives presented in Tables 4-7 would have a demonstrable effect on fish and aquatic invertebrate populations in the streams and watersheds in which they would be located.

230.32 – Impacts on other wildlife

Impacts described in Section 230.32 pertain to animal species only. Effects of enlarging Hunter Reservoir and Monument #1 Reservoir are disclosed in Chapter 3 of this document. The BLM's Grand Junction Field Office Resource Management Plan identifies Atwell Gulch as a Production Area and Winter Concentration Area for Bighorn Sheep (USBLM 2015) and a reservoir at this location would likely impact Bighorn Sheep. There is no evidence any of the alternatives contained in Tables 4-7 would have a demonstrable effect or impact on other animal species.

230.41 – Impacts to wetlands

The only alternatives presented in this document that will not have an impact on wetlands are those based on conservation (Table 7). Groundwater use (Table 4) has the potential to remove shallow groundwater used by wetlands adjacent to or near streams and rivers. All reservoir alternatives presented in Tables 5 and 6 will have some form of impact to wetlands, including inundation by a reservoir or desiccation due to water diversion. Impacts to wetlands, and potential mitigation opportunities, associated with Alternatives 1 and 2 are disclosed and discussed in Chapter 3 of this document. Additionally, detailed information on the nature of mitigation proposed for these impacts is discussed in Chapter 3. Impacts to wetlands resulting from any of the alternatives described in Tables 4-7 would be subject to mitigation according to federal law, policy, and regulation.

230.45 – Impacts to riffle and pool sequences

The use of additional Colorado River water and every alternative presented in Table 5 and 6 would impact riffle-pool sequences. All surface reservoir alternatives will impact riffle-pool sequences; however, the relative impact of a new reservoir will be greater than the impact of enlarging an existing reservoir. While there are no data to support the assertion that impacts to riffle-pool sequences resulting from any of the alternatives presented in Tables 5-6 would be significant, the overall level of impact can reasonably be predicted to be higher for all new reservoir alternatives. In this context, new reservoir alternatives (Table 5) are more environmentally damaging than reservoir enlargement alternatives (Table 6). An off-channel reservoir location would presumably relieve the impact to riffle-pool sequences resulting from an on-channel reservoir.

230.50 – Impacts to municipal and private water supplies

As this is a water development proposal, each alternative presented in this document has the potential to benefit water supplies. As described above for Section 230.22, two alternatives, increased Colorado River use (Table 4) and underground storage (Table 5) have the potential to reduce the quality of water Ute Water provides to its customers, which would constitute an impact (negative effect) as defined by the Clean Water Act. Each of the surface reservoirs described in Tables 5-6 will affect wetlands and these special aquatic sites play important ecological roles in water storage and water filtration. There is no evidence that any of the alternatives presented in Tables 6-7 will affect chronically the water quality in the Leon Creek drainage. In fact, for Alternatives 1 and 2 Ute Water has proposed wetlands specific mitigation that would replace both the acres and function of wetlands that would be lost at Hunter Reservoir and Monument #1 Reservoir. It is reasonable to expect that Ute Water would provide wetlands-specific mitigation for any of the alternatives in Tables 5-7. In the context of this section, 230.50, it is reasonable to conclude that increased Colorado River use and underground storage would impact the quality of water Ute Water provides to its customers and all other alternatives presented in Tables 4-7 would have no impact or a beneficial effect on water supply.

230.51 – Impacts to fisheries

The alternative water sources in Table 4 would likely have no impact on recreational fisheries in the area and this conclusion applies to the water conservation actions in Table 8. All reservoir alternatives in Tables 5-6 are likely to have a beneficial impact on recreational fisheries. This is due to the fact each of these alternatives will create or expand fish habitat in the form of a reservoir. An enlargement of Hunter Reservoir will have an additional beneficial impact to stream fishes in East Leon Creek, downstream from the dam. Ute Water has agreed to provide bypass flow in the form of a 0.5 cfs water release during winter in order to improve stream habitat conditions downstream. The input of relatively warm water from the bottom of Hunter Reservoir is expected to increase the amount of habitat and habitat suitability of the stream channel downstream from the reservoir. An enlargement of Hunter Reservoir is the only alternative for which a bypass flow has been proposed as potential mitigation.

230.53 – Impacts to aesthetics

This section identifies impacts to the aesthetic characteristics of a natural landscape that damage “vital elements that can contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area.” Alternatives that involve construction of new dams, reservoirs, roads, and water diversions could reasonably be considered inconsistent with this section considering there are practicable and reasonable alternatives available that would enlarge existing facilities.

230.54 – Impacts to parks, monuments, wilderness areas, and Roadless Areas.

Parks, monuments and other special areas mentioned in this section will not be impacted by any of the alternatives in Tables 4-7. While Roadless Areas are not expressly listed among the designations described by Section 230.54, the Forest Service considers impacts to Roadless Areas relevant to this section of the 404(b)(1) guidelines. Several alternatives would impact Roadless Areas and those impacts would be beneficial for some alternatives and detrimental for others. Enlarging Hunter Reservoir and Monument #1 Reservoir would benefit the roadless character of a Roadless Area because Ute Water has proposed decommissioning and removing Monument #2 Dam and its associated infrastructure, which is located within a Roadless Area, as mitigation for both Alternatives 1 and 2.

Several new reservoir construction alternatives involve construction activities, including road building, in Roadless Areas. These alternatives include both Big Park alternatives, Buzzard Creek Reservoir, and a reservoir upstream of Hunter Reservoir (Table 5). New reservoir construction within a Roadless Area would not be consistent with the Colorado Roadless Rule (36 CFR 294) or Section 230.54 as alternatives exist to enlarge existing reservoirs. Based on the criteria in Section 230.54, the Big Park alternatives, Buzzard Creek Reservoir, and a new reservoir upstream of Hunter Reservoir would have more environmental impact than the other alternatives presented in Tables 4-7.

Section 230.70

Guidelines in parts a, b, c, and f of this section of the 404(b)(1) guidelines suggest that the categories of alternatives presented above could be ranked from least impactful to most impactful this way: conservation (Table 7), alternative sources (Table 4), reservoir enlargements (Table 6), and new reservoirs (Table 5). As discussed above, alternatives presented in Tables 2 and 5 would not make contributions to Ute Water's future water demand that would alleviate the need to develop additional storage. Therefore, this section of the 404(b)(1) guidelines is most useful for contrasting new reservoir construction alternatives and reservoir enlargement alternatives. Parts a and b favor the selection of an existing reservoir alternative because a reservoir enlargement would minimize the smothering of organisms and not create new disruptions to water circulation patterns. A new reservoir would not be consistent with parts c and f, which are intended to favor the selection of existing reservoirs. It is also important to point out that mitigation activities proposed for Alternatives 1 and 2 would result in a net reduction in the number of reservoirs in the watershed and these alternatives would therefore be consistent with section of the 404(b)(1) guidelines.

Summary

As it would impact aquatic substrate, water circulation, water fluctuation, threatened and endangered species, terrestrial wildlife, wetlands, riffle-pool sequences, and aesthetics, a new reservoir at Atwell Gulch is likely the most environmentally damaging alternative presented in Tables 4-7. The use of additional Colorado River water along with all other new reservoir alternatives presented in Table 5 are nearly as environmentally damaging as Atwell Gulch. Considering NEPA's reasonableness requirement, the Clean Water Act's more stringent practicability requirement, and potential for environmental impacts described in the Clean Water Act's 404(b)(1) guidelines, one or more reservoir enlargements constitute the most environmentally friendly means by which Ute Water could accomplish their purpose and need. Alternative 2, the Forest Service's preferred alternative, and the alternative identified previously as a LEDPA to enlarging Hunter Reservoir (USACE 2012), entails the enlargement of a single reservoir. A single reservoir enlargement, therefore, should serve as the bar by which relative environmental impact is evaluated.

Of the reservoir enlargements presented in Table 6, only an enlargement of Vega Reservoir, Jerry Creek Reservoir, and Monument #1 Reservoir would satisfy Ute Water's purpose and need to store about 6,600

acre-feet at a single facility. Ute Water does not hold water rights within Vega Reservoir and there is no evidence they could be reasonably obtained by Ute Water. If Ute Water was able to obtain water rights in Vega Reservoir they would encounter significant logistical hurdles in water storage and operation (USACE 2012) that render this alternative neither reasonable nor practicable.

The Jerry Creek Reservoirs were constructed in the 1970s and Ute Water made the decision to store an additional 1,300 acre-feet of water at this facility in 2008. This was accomplished by increasing water surface elevation by 7 feet, which reduced the "freeboard" within the reservoirs from 12 feet to 5 feet. As Ute Water's engineers reported in 2012 (USACE 2012), storing at least 6,600 additional acre feet at the site could not be accomplished by enlarging the existing dams and levees. A complete reservoir rebuild could be confounded by unstable geology at the site (David Priske, Ute Water, personal communication, May 8, 2017). Despite the fact Ute Water holds approximately 7,800 acre feet of conditional water rights at the site they believe additional storage at the Jerry Creek Reservoirs is impossible.

An enlargement of Monument #1 Reservoir, which is analyzed for both alternatives 1 and 2, therefore, is the only reasonable and practicable alternative that would meet Ute Water's purpose and need while minimizing environmental impacts described in the Clean Water Act's 404(b)(1) guidelines. This is consistent with the Corps' 2012 determination (USACE 2012).

Chapter 3. Affected Environment and Environmental Consequences

Air Quality

Existing Conditions

While Grand Junction, Colorado is the largest urban center between Denver, Colorado and Salt Lake City, Utah, the air quality in Mesa County (in which Grand Junction and the Leon Creek watershed are located) meets or exceeds EPA air quality standards (Table 10).

Table 10. Air quality data for Mesa County, Colorado from 2012-2015. EPA air quality standards are presented for comparison. Source: epa.gov/outdoor-air-quality-data.

Year	Carbon monoxide	Nitrogen dioxide	Ozone	Sulfur dioxide	PM 2.5	PM 10	Lead
2016	1.8	0.8	0.07	-	22	34	-
2015	1.4	0.9	0.08	-	21	34	-
2014	1.7	0.9	0.07	-	21	45	-
2013	1.4	0.9	0.07	-	40	56	-
2012	1.6	1.0	0.9	-	24	143	-
Standard	35	100	0.12	75	35	150	0.15

Due to its remoteness and poor road conditions, the Leon Creek watershed experiences a low volume of motorized vehicle traffic. Snowmobile traffic along designated trails is consistent throughout winter months; however, it is reasonable to expect Leon Creek's airshed to have air quality at least commensurate to that for the entire county.

Environmental Consequences

Action Alternatives

Dam construction will last 3-4 years per facility and involve thousands of hours of heavy equipment operation and vehicle use. Construction activity will affect the air quality parameters listed in Table 10 and will also contribute greenhouse gases to the atmosphere. We used emissions data for heavy equipment published by Heidari and Marr (2015) in order to estimate pounds of greenhouse gases generated per 10-hour day (Table 11). These data were generated by direct measurement of emissions from 18 makes and models of backhoes, bulldozers, excavators, and loaders.

Table 11. Pounds of greenhouse gases produced per 10-hour day by four types of construction equipment. Estimates based on emissions data published by Heidari and Marr (2015).

Equipment	Carbon dioxide	Nitrogen oxides	Hydrocarbons	Carbon monoxide
Backhoe	385.4	2.9	0.2	0.2
Bulldozer	227.7	2.5	0.3	1.7
Excavator	441.3	3.1	0.3	0.4
Loader	164.5	2.7	0.1	0.9

The data in Table 11 make it possible, for example, to determine that in a 100-day construction season a single excavator would produce approximately 22 tons of carbon dioxide. In a 9-year construction period that same excavator would produce approximately 198 tons of carbon dioxide. It is conceivable construction activities will require multiples of one or more of the equipment types in Table 11.

Trucks of various sizes will be used to move workers and materials and these trucks emit air pollutants are varying rates (Table 12).

Table 12. Pounds of pollutants produced per 100 miles driven by 8 truck sizes. Calculations based on EPA vehicle emissions data available at www3.epa.gov/otaq/consumer/420f08027.pdf.

		Vehicle Type (Gross Vehicle Weight)							
Pollutant	**Fuel**	4-5 ton	5-7 ton	7-8 ton	8-9 ton	9-13 ton	13-16.5 ton	16.5-30 ton	> 30 ton
VOC	Gas	0.30	0.37	0.93	0.58	0.54	0.63	0.80	
	Diesel	0.04	0.04	0.06	0.06	0.08	0.10	0.10	0.12
THC	Gas	0.31	0.38	0.95	0.59	0.56	0.64	0.81	-
	Diesel	0.04	0.01	0.06	0.06	0.08	0.10	0.10	0.12
CO	Gas	2.47	3.48	7.45	4.31	3.99	4.87	6.28	-
	Diesel	0.18	0.20	0.26	0.26	0.30	0.38	0.53	0.68
NOx	Gas	0.60	0.64	0.91	0.82	0.80	0.92	1.08	-
	Diesel	0.68	0.73	0.96	1.00	1.32	1.64	2.02	2.42
PM 2.5	Gas	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-
	Diesel	0.02	0.02	0.02	0.02	0.04	0.04	0.05	0.05
PM 10	Gas	0.01	0.11	0.02	0.01	0.01	0.01	0.01	-
	Diesel	0.02	0.02	0.02	0.02	0.04	0.04	0.51	0.06

Table 12 shows that gasoline-fueled trucks generally emit more pollutants than diesel-fueled trucks; however, vehicles used for hauling large amounts of material, such as fill material, are going to use diesel fuel.

Despite construction related contributions of air pollutants and greenhouse gases in the amounts described above, it is not expected that those amounts directly, indirectly or cumulatively when combined with other actions in the area will exceed any National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS).

No Action Alternative

There would be no impacts to the air resource under the No Action Alternatives.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for effects to air quality resulting from Alternatives 1 or 2. The construction phase of Alternative 2 would be about half that of Alternative 1 resulting in proportionally less construction-related vehicle emissions.

Aquatic Wildlife

Endangered Colorado River Fishes

Existing Conditions

There are four fish species inhabiting the Colorado River that are protected as endangered under provisions of the U.S. Endangered Species Act: bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker. The U.S. Fish and Wildlife Service (USFWS) has determined that water projects in the upper Colorado River watershed that result in water depletion is likely to adversely affect these species.

Environmental Consequences

All alternatives analyzed in this document would result in water depletions and would therefore adversely affect these species.

The USFWS has previously determined, in BO GJ-6-CO-96-F-010 and BO GJ-6-CO-99-033-CP002, these species and their critical habitat continued existence may be jeopardized by the proposed Ute Water actions (USFWS 1998). The USFWS has stated in their biological opinions on *Plateau Creek Pipeline Replacement Project* that the action "is likely to jeopardize the continued existence of the Colorado Squawfish [now Pikeminnow], Humpback Chub, Bonytail Chub, and Razorback Sucker and result in the destruction or adverse modification of their critical habitat" However, USFWS also developed a reasonable and prudent alternative to avoid a jeopardy opinion, and provided a method for calculating future depletions related to the Ute Water Conservancy District system. All new depletions in the Ute Water system, including action alternatives described in this document, are included. The Ute Water system depletion from 1996 through 2005 totals 1119.5 acre-feet. Ute Water has paid depletion fees for up to 3,195 acre feet of new depletions as described in the BO. Ute Water is well within the allowable new depletion under the 1998 BO, including the action alternatives in this document. The USFWS provided documentation the aforementioned Biological Opinions remain in force in a letter dated August 22, 2016.

Management Indicator Species (MIS), USFS Region 2 Sensitive Species, Aquatic Fauna in the Leon Creek Watershed

Existing Conditions

The following management indicator species could be present in the Leon Creek watershed and be affected by any of the action alternatives described in this document: non-native cutthroat trout

(Oncorhynchus clarki), and rainbow trout (O. mykiss). Stocking records provided by Colorado Parks and Wildlife indicate non-native cutthroat trout have been stocked throughout the watershed including upstream of Hunter Reservoir and Monument #1 Reservoir. Rainbow trout have been stocked in lower Leon Creek, near its confluence with Plateau Creek. Other MIS trout species have not been stocked in the Leon Creek watershed.

The following USFS Region 2 Sensitive Species could be affected by any of the action alternatives described in this document: Colorado River Cutthroat Trout (*O. clarki pleuriticus*), Bluehead Sucker (*Catostomus discobolus*), Flannelmouth Sucker (*C. latipinus*), and Roundtail Chub (*Gila robusta*).

The Leon Creek watershed downstream from Monument #1 Dam and Hunter Dam has been affected by the presence of these structures for decades. Dams impact the hydrologic function and connectivity of a stream ecosystem. Additionally, dams can alter downstream water temperatures. Changes to the physical condition of a stream ecosystem may, obviously, affect the resident animal community. The abundance and diversity of animal species tends to decrease as elevation increases (Lomolino 2001). The confluence of Monument Creek and East Leon Creek is at approximately 9,500 feet elevation and the reservoirs are each above 10,000 feet in elevation; therefore, water temperature and small stream size likely constrain the diversity and abundance of animal species that occupied this portion of the watershed prior to human influence. Leon Creek is free-flowing from its confluence with Plateau Creek and Hunter Dam and Monument #1 Dam. While there are numerous diversions on Leon Creek, there is no evidence that contradicts the assumption that a fish can move freely throughout the un-dammed portion of the Leon Creek watershed at some point each year.

Aquatic macroinvertebrates spend at least part of their life cycle in water. Observations by state and federal personnel indicate insects are the most common aquatic macroinvertebrates in the Leon Creek watershed. In western Colorado high-elevation streams that have experienced little disturbance typically support insect species including caddisflies, mayflies, and stoneflies. No formal sampling for aquatic macroinvertebrates was conducted for this project; however, macroinvertebrates are easily observed during other sampling efforts, particularly for stream fishes. Observations throughout the Leon Creek watershed, including stream reaches adjacent to Monument #1 Dam and Hunter Dam, revealed large numbers of adult aquatic insects. Mayflies, in particular, appear to be extremely abundant. Numerous species of caddisflies, mayflies, and stoneflies are sensitive to disturbance and pollution and their presence directly downstream from Monument #1 Dam and Hunter Dam, therefore, is compelling circumstantial evidence that the alterations to the hydrology and temperature of these reaches have not been detrimental to resident macroinvertebrates.

The watershed contains suitable habitat for barred tiger salamander (*Ambystoma tigrinum*), striped chorus frog (*Pseudacris triseriata*), northern leopard frog (*Rana pipiens*) and boreal toad (*Anaxyrus boreas boreas*). Chorus frogs were the only amphibian species observed during field site visits in 2005 and 2006. Colorado Parks and Wildlife conducted extensive ground surveys of the lands surrounding Hunter Reservoir, Monument Creek, and Big Park. According to Jenn Logan, CPW Native Aquatic Species Biologist, chorus frogs and tiger salamanders were consistently observed in wetlands during these surveys, indicating these species are present throughout the upper Leon Creek watershed. CPW collected water samples throughout the area in order to use environmental DNA (eDNA) to determine if boreal toads were present in the watershed. Ms. Logan indicated none of the eDNA samples her team collected indicated boreal toads are present in the upper Leon Creek watershed. CPW used the eDNA samples to test for the presence of chytrid fungus, a disease vector that is negatively correlated with boreal toad presence and survival. The samples revealed the fungus is present throughout the upper Leon Creek

watershed. Ms. Logan opined the ubiquity of chytrid fungus throughout the sampled area could be a reason boreal toads are absent from the Leon Creek watershed.[1]

Leon Creek, like most Rocky Mountain streams, has been stocked extensively with non-native fish species in order to provide recreational opportunities for anglers. Cutthroat Trout (*Oncorhynchus clarki*) stocked historically in the watershed are a non-native variety. State stocking records show that Brook Trout (*Salvelinus fontinalis*) and Rainbow Trout (*O. mykiss*) have also been stocked in the Leon Creek watershed. Stream size and cold temperatures limit the size and recruitment of fish populations although observations in the field suggest trout species can reproduce in Leon Creek (see below).

Native Cutthroat Trout occupy the Leon Creek and are known to be present in the stream approximately 3 miles downstream of Hunter Reservoir Dam. These fish were last observed in 2010 when the stream was sampled by the Forest Service and Colorado Parks and Wildlife. Eight cutthroat trout were collected in a 367-foot section of the stream. A Rainbow Trout was also collected. Genetic testing indicated the 8 Cutthroat Trout collected were not genetically pure (L. Martin, CPW, personal communication 2010). Based on the very small number of cutthroat trout observed in the stream and the presence of non-native *Oncorhynchus*, the cutthroat trout in Leon Creek are not managed as a Conservation Population (Hirsch et al. 2013) by the Forest Service or CPW. There are no barriers between the 2010 sampling location and Hunter Reservoir Dam and it is unlikely native Cutthroat Trout occupy any portion of the stream in allopatry. Native Cutthroat Trout are not present upstream of Hunter Reservoir Dam. Despite the dearth of native cutthroat trout observed in 2010, among the 8 fish collected there were at least two age classes, indicating that reproduction had occurred within 2 years of sampling. Leon Creek was sampled by the Forest Service approximately 8 miles downstream from Hunter Reservoir Dam in 2015 and one non-native salmonid (genus *Oncorhynchus*) was observed during that effort. The Forest Service did not collect a tissue sample for genetic analysis of this individual fish.

The current status of native Cutthroat Trout in Leon Creek is significantly different than what was known when the Forest Service analyzed the proposal to enlarge Hunter Reservoir in 2007. Stocking records indicate the Colorado Division of Wildlife (now Colorado Parks and Wildlife) stocked greenback cutthroat trout, a variety native to Colorado, in the Leon Creek from 1979 through 1985. There is considerable uncertainty regarding the origins of many populations of "native" Cutthroat Trout throughout Colorado (Metcalf et al., 2012). While the genetic analysis results described above are consistent with the Cutthroat Trout observed in 2010 being native to the watershed, it is equally plausible that the fish observed in 2010 are descendants of the 1979-1985 stockings. There is, therefore, no compelling evidence the Leon Creek watershed supported a native trout population before Colorado became a part of the United States of America. If this scenario is true then alterations to the physical characteristics of the watershed may impact a single native fish species, Mottled Sculpin (*Cottus bairdi*). There is no evidence current water uses affect mottled sculpin and changes to reservoir operations included in the proposed action are unlikely to affect this species. Additionally, there is no evidence that current water uses affect non-native trout species present in the watershed. As the Leon Creek watershed has little significance as a recreational fishery (Lori Martin, CPW, personal communication), current and future impacts to stream fishes due to reservoir operations could be considered discountable from a conservation and recreational perspective.

Data are lacking for the extent of lower Leon Creek and Plateau Creek that are occupied by warm-water fishes including the Region 2 Sensitive Species: Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub. While these species are present in Plateau Creek, stream temperatures and physical habitat

[1] Summary of email correspondence between Jenn Logan, CPW, and Melvin Woody, USFS Aquatic Biologist. Email received by Mr. Woody on March 1, 2016. A copy of the email is present in the project record.

characteristics in Leon Creek and East Leon Creek are not conducive to occupation by Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub (Ptacek et al., 2005; Rees et al., 2005; Rees et al., 2005).

Environmental Consequences

The following discussion does not include presentation of impacts related to construction activities, such as sediment inputs to streams. While these impacts are important considerations in evaluating a construction proposal near aquatic habitat, the proposed action will be conditioned with a number of design features to prevent or minimize the short-term impacts to streams, riparian areas, and aquatic animals resulting from construction (Appendix A). The focus of the following discussion is the long-term consequences of the proposed action and alternatives on stream habitat and aquatic populations in the Leon Creek watershed.

Monument #1 Reservoir (Alternatives 1 & 2)

This discussion applies to enlargements to Monument #1 Reservoir resulting from the implementation of Alternatives 1 and 2. Enlarging Monument #1 Reservoir has several advantages relative to other reservoir locations with respect to impacts on stream habitat and aquatic animal populations: 1) enlarging this dam would not create a new impoundment and would not result in increased fragmentation of stream habitat in the Leon Creek watershed. Monument #1 Dam isolates approximately 2.8 miles of perennial stream habitat in an approximate 4.3 square mile watershed. This represents approximately 7.4 percent[2] of the perennial stream miles and 8.6 percent of the watershed area of the Leon Creek watershed; and 2) an enlarged reservoir would increase the amount of lentic fish habitat at the site and within the watershed. The depth of the reservoir's dead pool would allow for overwinter survival of stocked fish. CPW could elect to stock the reservoir with a recreational fish population or use the reservoir to establish a population of native cutthroat trout.

Enlarging Monument #1 Reservoir will result in the inundation of several hundred yards of Monument Creek upstream from the dam. It is unlikely fish occupy this portion of Monument Creek; however, aquatic macroinvertebrate populations that occupy this portion Monument Creek would be displaced or lost. Any fish present in Monument #1 Reservoir during construction and reservoir filling are unlikely to be impacted. Downstream from the dam accretion from the surrounding watershed results in Monument Creek being perennial within several hundred feet of the dam. An enlarged reservoir will not result in additional dewatering downstream from the dam and no mitigation is proposed for this impact.

An enlarged Monument #1 Reservoir would take 3-5 years to fill. Once filled Ute Water proposes to maintain the reservoir at full volume until such time it requires the water to meet future water demands. The impacts to seasonal hydrology associated with holding back additional snowmelt may be restricted to the 3-5 year filling period and in extreme circumstances. Should Ute Water need to begin releasing the full volume of the reservoir on an annual basis, the direct effects would not manifest themselves for years. However, changes in the annual hydrograph associated with retaining a larger portion of snowmelt in the enlarged reservoir and releasing that water on an as-needed basis is an impact to the Monument Creek watershed and the Leon Creek watershed that cannot be avoided following reservoir enlargement.

Hunter Reservoir (Alternative 1)

Ute Water's proposal to enlarge Hunter Reservoir will result in several benefits to aquatic resources including fish populations, stream habitat, and riparian wetlands. 1) Enlarging this dam would not create a new impoundment and would not result in increased fragmentation of stream habitat in the watershed. Hunter Dam isolates approximately 1.5 miles of perennial stream in an approximate 1.5 square mile

[2] Stream length percentage based on combining the un-dammed perennial stream miles in the Leon Creek watershed with perennial stream miles upstream from Monument #1 Dam.

portion of the Leon Creek watershed.[3] 2) The reservoir will be significantly improved lentic fish habitat. Part of the proposed action includes a conservation pool within the reservoir to promote overwinter survival of stocked fish. When Hunter Reservoir has been stocked it has been done so via airplane at great expense to CPW and with limited return to creel due to the fact stocked fish cannot survive the winter. The conservation pool means that CPW could elect to stock the reservoir with a recreational fish population or use the reservoir to establish a population of native cutthroat trout. The paucity of spawning habitat upstream of Hunter Dam will likely be a significant factor in determining how best to use the enlarged reservoir for fisheries management objectives. Under either scenario the conservation pool would increase greatly overwinter survival and improve the fishery. Additionally, the reservoir will serve as a source population for Leon Creek and its tributaries as fish are likely to move downstream through the dam. 3) As part of the proposed action Ute Water will remove approximately 1 mile of road from the riparian area of East Leon Creek. This portion of NFSR 280 crosses East Leon Creek at several points and breaks the longitudinal (up-down) connectivity of East Leon Creek as well as lateral connections between the stream and its riparian area. Additionally the road impacts riparian wetland function, impacts that can be erased by moving the road out of the riparian area.

It is reasonable to conclude that removing the chronic perturbation resulting from the road would improve wetland function along East Leon Creek and increase water quality in the watershed. Ute Water will make several additional improvements to NFSR 262 where it impacts stream habitat and riparian wetlands downstream from East Leon Creek, additional improvements to wetlands that are likely to benefit water quality. 4) Ute Water is going to implement a 0.5 cfs winter instream flow from Hunter Reservoir in order to maintain stream habitat for resident aquatic life. The additional volume will increase pool volumes in East Leon Creek and potentially alleviate impacts of stream ice on resident aquatic life. Stream ice at high elevations can affect significantly habitat use by resident fish populations (Needham and Jones 1959; Cunjak and Power 1986; Chisholm et al., 1987; Riehle and Griffith 1993) 5) Frequent, violent changes in discharge have the potential to harm stream habitat and aquatic life (Cushman 1985). Adjusting the rates of change in reservoir outflow will more closely mimic natural discharge and contribute to improved stream habitat and wetland health. Conversely, prolonged periods of relatively stable flows would allow fine sediments to accumulate in the stream channel, which could reduce ecosystem productivity. So Ute Water has agreed to implement a flushing flow every three years in order to move nutrients and sediments through East Leon Creek and reinvigorate connections between the stream and wetlands surrounding it. The addition of a flushing flow from Hunter Dam is a benefit to aquatic resources, including wetlands.

Enlarging Hunter Reservoir will result in the inundation of several hundred yards of East Leon Creek upstream from the dam. Non-native trout are present in this portion of East Leon Creek; however, these individuals would not be lost as the reservoir will provide habitat that is arguably of greater quality than what is currently occupied by these animals. However, aquatic macroinvertebrate populations that occupy this portion East Leon Creek would be displaced or lost.

An enlarged Hunter Reservoir would take 3-5 years to fill. Once filled Ute Water proposes to maintain the reservoir at full volume until such time it requires the water to meet future demands. The impacts to seasonal hydrology associated with holding back additional snowmelt may be restricted to the 3-5 year filling period and in extreme circumstances. Should Ute Water need to begin releasing the full volume of the reservoir on an annual basis, the direct effects would not manifest themselves for years. However, changes in the annual hydrograph associated with retaining a larger portion of snowmelt in the enlarged

[3] 1.5 square miles is 3.3 percent of the Leon Creek watershed. 1.5 stream miles is 4.2 percent of the perennial stream miles in the watershed composed of the un-dammed portion of Leon Creek and the perennial stream habitat upstream of Hunter Dam.

reservoir and releasing that water on an as-needed basis is an impact to the East Leon Creek watershed and the Leon Creek watershed that cannot be avoided following reservoir enlargement.

No Action Alternative

Opting to do nothing implies the stream habitat conditions and aquatic populations present in the Leon Creek watershed would not be impacted by construction activities at any dam site. The benefits to stream habitat and riparian wetlands and the potential increases to water quality associated with the proposed action and mitigation would not be realized.

Summary of Mitigation and Beneficial Effects

Under Alternative 1, Ute Water has proposed a 0.5 cubic feet per second (cfs) wintertime release from Hunter Reservoir in order to increase streamflow volume in East Leon Creek. Such an action will presumably improve winter habitat conditions in East Leon Creek for resident fish species. A wintertime release from an enlarged Hunter Dam would be compensatory mitigation for impacts to aquatic habitat and life. Improvements to NFSRs 262 and 280 and NFST 518 will benefit stream channels and aquatic populations by improving riparian habitat quality and reducing sediment inputs. Restoration of riparian areas and stream crossings associated with road improvements are beneficial effects of Alternative 1.

Under Alternative 2, improvements to NFSR 262 and NFST 518 would have beneficial effects on riparian habitat and stream channels. These actions would effectively reduce the net impact to wetlands resulting from enlarging Monument #1 Reservoir.

Cultural Resources

Numerous laws, regulations and Forest Service policies direct the inventory, protection, restoration and interpretation of heritage resources. These include the National Historic Preservation Act, the National Environmental Policy Act, the National Forest Management Act, the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the American Indian Religious Freedom Act, 36 CFR 800, FSM 2300

The National Historic Preservation Act (NHPA) protects historic properties. When an undertaking, as defined in 36 CFR 800, is begun, all historic properties are to be located and evaluated for their potential to be placed on the National Register of Historic Places. Those sites determined to be eligible for the Register are identified as "historic properties." The State Historic Preservation Office (SHPO), Advisory Council on Historic Preservation (ACHP), Native American Tribes and interested public must be informed of potential effects to any historic property. Agreement on mitigation of effects to all historic properties must be reached through consultation with SHPO and the ACHP before any project may take place.

A series of federal laws mandate that the impact of federally funded or permitted activities on historic properties, also referred to here as cultural or heritage resources, and the protection of these properties be considered prior to the initiation of management activities or undertakings. The value of historic properties on national forests is derived from the public's recognition, beginning early in the twentieth century that these nonrenewable resources are important and should be protected. Through these laws, the public commemorates the past by recognizing specific places where activities and events occurred.

Existing Conditions

The entire Area of Potential Effect (APE) for the project includes a total of 512.9 acres. Proposed associated project activities that could affect historic properties have been identified as 1) the Hunter and

Monument reservoir expansions that would involve dam reconstruction and result in the inundation of a larger area; 2) the re-routing and upgrade of access routes to these reservoirs; 3) the establishment of a 1-acre work camp/staging area at the base of the Monument Trail; 4) the re-routing of a portion of the existing recreational Monument OHV trail that would be inundated by the proposed Monument No. 1 reservoir expansion; 5) the upgrade and use of an access route to Monument Reservoir No. 2 to decommission an existing dam; and 6) the upgrade and use of Park Creek Road to access the Monument and Hunter reservoirs.

More specifically, Alternative 1 includes the removal of the Monument Reservoir #2 dam to enlarge the Monument No. 1 Reservoir. Additionally, all road beds will be improved to a maximum running width of 15 feet. The Park Creek Road improvements will be confined to the existing road bed, as the road is currently 12 to 15 feet in width. Exceptions to the confinement of the Park Creek Road improvements to the existing road bed includes areas where lead-out ditches will be constructed along the road to improve drainage. None of these ditches will extend more than 50 feet from the existing road. Road or trail segments that have been re-rerouted may also be reclaimed (disturbance would be confined to a 100-foot-wide corridor). As a result, the APE for all access roads is defined as 50 feet in width on either side of the road for a total corridor width of 100 feet along the existing road or proposed re-route locations.

Surveys and Sites in APE

Class III cultural resource surveys of the areas affected by Alternatives 1 and 2 were conducted in compliance with the National Historic Preservation Act of 1966 (NHPA) and other Federal law, regulation, policy and guidelines regarding cultural resources. In general, cultural resource inventories are conducted to meet requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C 4321), the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701) and the NHPA. These laws are concerned with the identification, evaluation and protection of fragile, non-renewable evidence of human activity, occupation and endeavor reflected in districts, sites, structures, artifacts, objects, ruins, works of art, architecture and natural features that were of importance in human events. Such resources tend to be localized and highly sensitive to disturbance.

Part of the inventory process is to ascertain the significance of any recorded cultural properties because the NHPA directs federal agencies to ensure that federally-initiated or authorized actions do not inadvertently disturb or destroy significant cultural resource values. Significance is a quality of cultural resource properties that qualifies them for inclusion in the National Register of Historic Places according to prescribed criteria given in the Code of Federal Regulations. Field assessments regarding significance are made as recommendations by the cultural resources consultant to the federal agencies and State Historic Preservation Officer (SHPO). The final determination of the site significance is made by the controlling agencies in consultation with the SHPO and the Keeper of the Register.

The Code of Federal Regulations is used as a guide for the in-field site evaluations. Titles 36 CFR 50, 36 CFR 800 and 36 CFR 64 are concerned with the concepts of significance and (possible) historic value of cultural resources. Titles 36 CFR 65 and 36 CFR 66 provides standards for the conduct of scientific data recovery activities. Finally, Title 36 CFR 60.4 establishes the measure of significance that is critical to the determination of a site's NRHP eligibility, which is used to assess a site's research potential.

Adequate cultural resources inventories by Forest archaeologists were conducted for the proposed Hunter Reservoir Enlargement and Monument #1 and 2 Reservoirs. In July 2017, the Forest Service will complete surveys of 32 acres around Monument #1 Reservoir that would be inundated by Alternative 2.

A total of 15 cultural inventories have been conducted within the entire *area of potential effect* (APE) (Table 13). These inventories have identified a total of 17 cultural resources within and around the APE

(Table 14). Fourteen of the 17 cultural resources are prehistoric lithic scatters. The remaining three cultural resources include a historic corral and the Hunter and Monument Reservoirs. Of the 17 cultural resources, two sites, 5ME1312 and 5ME11513, are considered to be *needs data* sites for listing on the National Register of Historic Places (NRHP). Additionally, two cultural resources, 5ME18155 and 5ME18610, are considered *eligible* for listing on the NRHP. The remaining 13 cultural resources are considered *not eligible* for listing on the NRHP, including the two existing reservoirs. The reservoir sites are *not eligible* to the NRHP because they lack integrity of materials, design, workmanship and association that would allow them to convey their historic character and render them eligible to the NRHP under Criteria A and C. The sites are not known to be associated with people important in local history, and they also lack the ability to provide additional significant information about local history that would make it eligible to the NRHP under Criterion D.

Table 13. Summary of cultural resource inventories in project area.

Report Number	Report Name	Author	Year	Inventory Level
R1980020401/ I-80-01-011	Kenny Creek #1 Well and Access	Babcock	1980	Intensive
I-81-01-011	Kenny Creek #1 Well and Access, Site Testing	Babcock	1981	N/A
R1986020401011/ I-86-01-050	Grant Norpac Seismic #7	O'Neil	1986	Intensive
R1989020401002/ I-88-01-019	Leon Creek Seismology	Connor	1987	Intensive
R1997020401/ I-97-01-089	Leon Aspen Sale	Crum	1997	Intensive
R2002020402007	Hunter Reservoir Expansion	Crum	2002	Intensive
R2002020402032	Hunter Reservoir Spillway	Crum	2002	Intensive
R2006020402060	Hunter Reservoir Upstream Addition	Crum	2006	Intensive
R2006020402064	Ditch Bill Reservoirs on Grand Mesa	Lawrence	2006	Intensive
R2006020402070	Big Park Reservoir Alternative	Funka	2006	Broad
R2006020402075	Leon Lake Road Rehab	Crum	2006	Intensive, Broad
R2006020402078	East Leon Reservoir Alternative	Funka	2006	Intensive
R2011020402157	Monument #1 Reservoir Alternative (Class III Cultural Resources and Paleontological Inventory)	Connor et al..	2011	Intensive
R2011020402157A	Limited Testing and Evaluation of Prehistoric Sites 5ME18157 and 5ME18158	Connor et al..	2011	Testing
R2012020402180	Cultural Resource Inventory and Site Evaluations the Proposed Expansions of Monument No. 1 and Hunter Reservoirs	Lane	2012	Intensive

Table 14. Summary of National Register of Historic Places eligibility for cultural resources in project area.

State Number	Site Type	NRHP Status
5ME01309	Prehistoric	Field Not Eligible
5ME01311	Prehistoric	Officially Not Eligible
5ME01312	Prehistoric	Officially Needs Data

State Number	Site Type	NRHP Status
5ME01328	Prehistoric	Field Not Eligible
5ME01329	Historic	Officially Not Eligible
5ME01346	Prehistoric	Field Not Eligible
5ME11506	Prehistoric	Officially Not Eligible
5ME11507	Prehistoric	Officially Not Eligible
5ME11513	Prehistoric	Officially Needs Data
5ME13311	Prehistoric	Officially Not Eligible
5ME15438	Historic Monument No. 2 Reservoir	Officially Not Eligible
5ME18155	Prehistoric	Officially Eligible
5ME18156	Prehistoric	Officially Not Eligible
5ME18157	Prehistoric	Officially Not Eligible
5ME18158	Prehistoric	Officially Not Eligible
5ME18159	Historic Monument No. 1 Reservoir	Officially Not Eligible
5ME18610	Prehistoric	Officially Eligible

Environmental Consequences

NHPA Section 106 compliance was completed for the proposed action in 2012. Below is summary of the cultural resource surveys and affected historic properties within the APE.

All Alternatives

All action alternatives involve the construction of a staging, or transfer, area along NFSR 262. The use of the staging area has the potential to affect Site 5ME1312. The transfer area will be located in a portion of the site where recreational camping and parking currently occur. The site was originally recorded and tested in 1980. Site 5ME1312 is officially considered to be a needs data site for listing on the National Register of Historic Places; therefore, the site is treated like a historic property.

In 1997 the site was visited and re-recorded. Due to camping activities and the paucity of artifacts located in the transfer area portion of the site, this area was identified as not contributing to the eligibility status of the site. The 2012 site visit confirmed the 1997 assessment that the transfer area portion of the site was extensively impacted by camping and parking.

The following are conditions to which Ute Water will adhere under all action alternatives in order to protect this site that were agreed upon by the Forest Service and CO SHPO (March 2013). The staging area is located in the western portion of site 5ME1312 that was determined as not contributing to the eligibility of the site for listing on the NRHP. Therefore, the Forest Service and Colorado State Historic Preservation Officer (CO SHPO) staff agreed that in order to avoid negatively impacting the site, the parking area should be plated with gravel and not bladed. If any blading or re-contouring cannot be avoided within the western portion of the site, work should be monitored by an archaeologist. No project activities will occur east of NFSR 262 within the site. Improvements to NFSR 262 will not involve any new disturbance outside the existing road corridor. Placement of rock and gravel is proposed for the existing road bed to build up the road prism. This action will also protect the site.

Unlike other resources such as vegetation or wildlife, heritage resources are not renewable. Damage or destruction is generally permanent. Although repairs may be possible in some cases, the historic nature of a resource is generally compromised once it has been impacted, and its eligibility for the National Register of Historic Places may be affected. Under all alternatives, the Heritage Program will continue to

provide support to all of the resource projects, as required by Section 106 of the NHPA. This includes the evaluation and identification of appropriate sites for the National Register of Historic Places. In addition, the program would include inventory as required by section 110 of the NHPA, analysis, protection of significant heritage resources from vandalism and other negative human impacts, and from natural destruction. The Heritage Program staff will identify opportunities for interpretation of heritage resources for public enjoyment and education, using established programs such as Passport In Time, and working closely with the interpretive staff.

Direct and indirect effects to heritage resources under the No Action Alternative are discussed below and are not attributed to the action itself. However, the Alternative activities would directly and indirectly affect sites. Direct effects to sites 5ME1312, 5ME18155 and 5ME18610 are associated to the increased use of the roads that pass through the sites. The potential increase of traffic on the road increases the chance for direct ground and vegetation disturbance to occur at the site through parking and vehicles going outside of the road and parking corridors. This disturbance can directly affect potential buried cultural deposits and damage and move artifacts across the site.

More people passing through the site could result in the indirect effects of illegal artifact collection, vandalism and excavation. Additionally, the direct effect of ground and vegetation disturbance from off-road recreation across the sites indirectly increases erosion of the site surface.

A beneficial direct effect would be closing the roads that pass through the sites. This would prevent off-road users impacting the ground surface, and indirectly prevent the likelihood of illegal artifact collection, vandalism and excavation. Also, erosion to the site surface from the road cut and off-road use would be lessened.

Historic and present actions that have affected heritage resource sites within the planning area include livestock grazing activities, timber harvest, vegetation and fuels management, fire suppression activities, road construction, reservoir construction and dispersed recreational use. Historically, cattle and sheep grazing, as well as wildlife movement, have caused direct impacts through trampling and indirect effects of soil erosion. Also, the road construction and road maintenance has likely caused erosion over time to the sites. The construction of the roads has also destroyed the portion of each site over which the road passes.

Alternative 1

Monument #1 Reservoir: A cultural resource survey was conducted in 2011 and 2012 for the proposed action. The 2011 report identified three *needs data* sites, 5ME18156, 5ME18157 and 5ME18158. These sites would be adversely affected by the project activities if the sites were deemed eligible for listing on the NRHP. All three sites were tested in 2012 and determined to be *not eligible* to the NRHP. Sites 5ME18157 and 5ME18158 are located in the inundation zone of the reservoir. Due to the site testing efforts and the not eligible status of the three sites, no mitigation actions are necessary during project implementation. Concurrence from the CO SHPO office on this determination was obtained on January 31, 2013.

Additionally, during the 2012 survey, a historic property, 5ME18155, was located, the Monument Trail. The site is considered *eligible* for listing on the NRHP.

Hunter Reservoir: Cultural resource surveys for the proposed action were conducted in 2003 and 2005. These surveys documented that reservoir expansion activities would not impact any known significant cultural resources. Because no cultural resources were located during the surveys, negative results reports were written and concurrence from the CO SHPO is not required per the Colorado State Negative Results Programmatic Agreement between the Forest Service and the CO SHPO.

An additional cultural resource survey was conducted in 2012 for newly added areas to Alternative 1 not surveyed during the 2003 and 2005 cultural resource surveys. During this survey a historic property, 5ME18610, was located along the reservoir access road. The site is considered officially eligible for listing on the National Register of Historic Places.

Alternative 2

Effects are expected to be similar to Alternative 1 for Monument #1 Reservoir; however, additional fieldwork will be completed in July 2017 on 32 acres of additional inundation at the Monument #1 site that was not surveyed previously. A supplemental information report will added to the project record after the completion of fieldwork.

No Action Alternative

If the No Action Alternative is chosen, all three historic properties, 5ME1312, 5ME18155 and 5ME18610, would continue to be impacted by various Forest Service activities. Recreational activities are likely to impact the site, as all three sites are bisected by roads. Continued use of the roads by recreational users could impact the sites in multiple ways. The road bed could become wider, thereby cutting further into the site and disturbing potential buried cultural deposits and surface artifacts. Additionally, it is not uncommon for OHV users to illegally go outside of the road corridor potentially impacting the sites through rutting. Finally, the roads passing through the sites increase the chance for the illegal collection of artifacts by recreationists by allowing easy site access. Site 5ME1312 is also susceptible to impacts from recreational camping on the eastern portion of the site as observed through the decreasing number of artifacts located there.

Various additional impacts to the sites would occur if no action is taken. One impact includes the natural erosion processes that occur to the ground surface from the elements. Grazing activities impact the sites through the breaking and moving of artifacts, as well as increase erosion on the site. In the event that a commercial timber harvest would occur, the sites would be protected from the logging activities, but may potentially be more exposed to artifact collectors and erosional processes with the removal of surrounding timber. Also, timber harvest and thinning activities in the area of heritage resource sites may increase the potential for livestock damage. Road improvement projects have potential to impact the sites in the event the road improvement actions go outside of the road corridor. Finally, catastrophic wildfires and poorly managed prescribed burns can destroy sites and cause severe surface erosion to occur at sites with the loss of vegetation.

There is an opportunity cost associated with the no-action alternative by which a beneficial effect of road improvement and relocation would benefit two sites. Under Alternative 1, Ute Water plans to re-route a portion of NFST 518 and a portion of NFSR 280 in order to facilitate heavy equipment traffic during the construction phase of the project. Relocating these routes would move each of them away from cultural sites to which they are currently adjacent. While this benefit is tangential to the purpose of the re-routes it would be a benefit to two cultural sites that are currently impacted by travel routes.

Summary of Mitigation and Beneficial Effects

Re-routing NFSR 280 (Alternative 1) will remove a portion of this route that impacts a cultural resource site located along East Leon Creek. Re-routing NFST 518 (Alternatives 1 & 2) will remove a portion of this route that impacts a cultural resource site located along Monument Creek. The Forest Service does not consider these actions compensatory mitigation; however, they are beneficial effects of Alternatives 1 and 2.

Geology and Minerals

Existing Conditions

The proposed site and its alternatives are located within the Colorado Plateau Physiographic Province, which is generally characterized by dissected plateaus with strong relief (Fenneman and Johnson 1946). The area is located within the Piceance Basin, bounded on the west by the Uncompahgre uplift and on the east by the White River uplift. No faults have been mapped in the area. The sedimentary bedrock on the Grand Mesa is capped by basalt flows, where volcanic magma has cut through in the form of dikes and plugs. The basalt flows on the Grand Mesa are approximately 9 million years old (Yeend 1969). The basalt cap protects the sedimentary rocks below from erosion. This landform was formed where uplift and erosion created a plateau that was once a large flat plain. On Grand Mesa, the movements of ice caps that covered all or portions of the plateau during the past 20,000 years have also shaped the geology and topography. The melting and final retreat of the ice caps left deposits of glacial till in the form of hummocks, moraines, and crevasse fills (all glacial features) across the plateau. The glacial till deposits consist of large basalt boulders, gravel, sand and loams. Retreating ice caps left many depressions that formed shallow lakes and that have been the sites for most of the reservoirs constructed on the Grand Mesa. The Grand Mesa has over 350 reservoir or natural lakes from glacial landforms. These water bodies provide a wealth of aquatic wildlife and wetland areas and are generally managed by the Forest Service with the exception of those on private property near the Forest boundary.

Geologic mapping of the Project Area consists primarily of surficial glacial deposits (till) and quaternary alluvium and colluvium deposits. The stratigraphy of the general Project Area consists of the Uinta formation, Green River Formation, Wasatch Formation, Mesa Verde Formation and Mancos Formation (Ellis and Freeman 1984). The surface bedrock grades from the Uinta Formation underlying Hunter Reservoir and Big Park to the Wasatch Formation around Monument #1 Reservoir to the north. The Wasatch Formation contains clay stones where there has been widespread mass wasting and slumping around the Big Park Reservoir area. These landslides and slumps have been mapped by the Colorado Geologic Survey (CGS) as far south as Big Park (Soule 1988). There are areas around the Mesa Lakes that have evidence of more recent slumps and slides associated with these formations, but the slumps predate the last glacial period on the Grand Mesa. The high flat basalt flows, mentioned previously, are surrounded by, what is known as, “landslide benches” caused by slumping of the basalt (Yeend 1969). These “slump blocks” vary in width from several feet to several miles depending on the amount of slumping. In general, the basalt on the Grand Mesa is formed from a series of volcanic eruptions approximately 10 million years ago. The lava ponded and cooled in low areas and, because of its hardness, has subsequently protected the underlying softer sedimentary rocks of the Uinta and Green River Formations. Unprotected strata adjacent to the basalt-capped Grand Mesa were stripped away to produce the valleys of the Colorado and Gunnison Rivers and Plateau and Kannah Creek.

As depicted in the 1993 GMUG Oil and Gas Leasing EIS (Forest Service 1993), the eastern half of the Project Area is covered by the Discretionary No Leasing stipulation, meaning that the area is not available for oil and gas leasing. The remainder of the Project Area is available for leasing and covered by stipulation, including No Surface Occupancy, Controlled Surface Use and Standard Lease Terms. However, no oil and gas leases exist within the project area.

The State Division of Reclamation Mining Safety (DMRS) shows no mineral or coal permits in the vicinity. The DMG does show that a now-terminated permit for a gravel pit near Vega Reservoir was issued in 1981. No oil and gas leases exist within the Project Area.

Environmental Consequences

Monument #1 Reservoir (Alternatives 1 & 2)

Monument #1 Reservoir is located in an area designated as "discretionary no lease" in the GMUG Forest Plan, enlarging the reservoir under Alternatives 1 and 2 would not affect the availability of oil and gas resources in this area.

Hunter Reservoir (Alternative 1)

A 2005 geotechnical investigation of the proposed reservoir area found no evidence of existing landslide masses or other features that could be impacted by raising the reservoir level. The underlying Uinta Formation does not have the significant shrink-swell factor that the Wasatch Formation to the north has. The slopes around the rim of Hunter Reservoir are generally less than 33 percent and should remain stable. Any potential mass movement would be prevented by the Best Management Practices presented in Appendix A.

The topography in the west borrow area would change slightly, as some material from the basalt talus would be used as riprap in the construction process. The design features would ensure that the slope of the talus is not undercut or over-steepened to create a potentially unstable slope.

About 61 acres of land currently available for oil and gas leasing with standard lease terms would be inundated following construction of the enlarged dam. This would prevent surface occupancy, but the resource could still be extracted with directional drilling

Enlarging Hunter Reservoir would remove surface area from location of well pads, roads, etc., for exploration and development of oil and gas resources. Those resources should still be able to be recovered through directional drilling.

No Action Alternative

Mineral resources would not be affected under the No Action alternative.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for impacts to this resource area.

Paleontological Resources

Existing Conditions

Monument #1 Reservoir (Alternatives 1& 2)

There are several exposed portions of the Paleocene-Eocene Wasatch Formation at the Monument #1 Reservoir site (Western Slope Paleontological Services 2014). The Wasatch Formation is composed of materials deposited through fluvial processes associated with streams, rivers, and other waterbodies. A report detailing a 2012 investigation of the Monument #1 site describes the Wasatch Formation as having the potential to contain "scientifically important" fossils. Fieldwork associated with this report located and identified a number of fossils at the Monument #1 site that are located in areas that would be inundated by an enlarged reservoir (Western Slope Paleontological Resources 2014).

Hunter Reservoir (Alternative 1)

The subsurface geology of the area around Hunter Reservoir is composed of the Uinta Formation. The Eocene Uinta Formation is a producer of significant fossils, specifically mammal bones and plant material. No fossils were found during a geotechnical investigation in 2005 (GEI Consultants 2006). Material associated with the Uinta Formation is beneath basalt and glacial till substrates and would only be exposed following a deep excavation.

Environmental Consequences

Monument #1 Reservoir (Alternatives 1 & 2)

Fieldwork in 2012 located several fossils at the Monument #1 Reservoir site. The report detailing that investigation recommended that exposed portions of the Wasatch Formation be surveyed and fossil material be collected prior to filling an enlarged Monument #1 Reservoir (Western Slope Paleontological Resources 2014). It is likely that fossilized material will be inundated by an enlarged reservoir at this site. As this site differs from Hunter Reservoir in the relative commonality of paleontological resources additional design features are likely to be imposed regarding areas that will be inundated by an enlarged reservoir. See Appendix A for existing design features associated with paleontological resources.

Hunter Reservoir (Alternative 1)

No fossils were found during a geotechnical investigation of the Hunter Reservoir site in 2005 (GEI Consultants 2006) and the geology of the site reduces significantly the likelihood that fossils would be encountered during surface work. Excavation for the dam enlargement, however, will encounter bedrock and fossils within that formation could be impacted should it be excavated. Should fossils be exposed during surface work or as a result of excavation work the Forest Service will be notified immediately (see Appendix A).

No Action Alternative

There would be no change to paleontological resource conditions under the No Action Alternative.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for impacts to this resource area.

Rangelands

Existing Conditions

All action alternatives are located within the boundaries of the Leon Allotment livestock grazing management area. The Leon Allotment includes 50,915 acres (of which approximately 41,909 acres are considered suitable for grazing). Grazing permits are allocated to 13 permittees and authorize up to 1,712 cow-calf pairs. The season of use is July 1 to October 5. Forage use on the allotment is 7,209 Animal Unit Months (AUM's- determined by 3.19 months of use × 1,712 pairs of cattle × 1.32 animal unit factor). The estimated average grazing capacity of the allotment is 5.8 acres per AUM (determined by the suitable acres divided by the number of AUM's permitted = 41,909 acres/7,209 AUM's). The allotment is divided into ten pasture units delineated by fences and natural barriers.

The open meadow around the Monument #1 Reservoir area is typically grazed from August through mid-September. This area is the main access to the upper reaches of the Monument Creek drainage. The surrounding timber limits travel so the drainage bottoms are used to access the higher country. The wet

meadow surrounding the Hunter Reservoir area is typically grazed from late July to mid to late August. Cattle graze the meadows and drainages surrounding Hunter Reservoir, up to the boulder fields on the divide between Leon Creek and Leroux Creek, which runs to the south. The very productive grassland in Big Park is typically used during September and early October. This area is important for gathering the cattle to prepare to remove them from the Forest at the end of the grazing season.

Environmental Consequences

All Action Alternatives

Actions associated with the enlargements of Hunter Reservoir and Monument #1 Reservoir, including fencing the area around Monument #2 Reservoir would result in a loss of 154 AUMs or 2 percent of the current grazing capacity. This is a minor impact to grazing capacity in the allotment and the number of cow-calf pairs within the Leon allotment would not be reduced as a result of any action alternative.

There will be a short-term impact of construction traffic, which could disrupt cattle movement and create hazards for drivers and cattle.

Due to increased traffic, implementing the proposed action will necessitate the installation of a new cattle guard at the south end of Big Park on NFSR 262, where the East Leon Trail, West Leon trail, and NFSR 280 converge. In addition, the fence at this location will need to be moved so that two gates on the west side of Leon Creek are eliminated.

Trail re-routes that are included in the proposed action will be necessary to allow cattle access to the watersheds upstream from Monument #1 Reservoir and Hunter Reservoir. The current routes taken by cattle and permittees will be inundated when the reservoirs are enlarged.

The “transfer area,” located about three miles south of the Forest boundary is where cattle are gathered prior to removal from the Forest each fall. Grazing permittees use temporary corrals at this site. Proposed improvements at the transfer area will help all users, including permittees, but the increased use will require coordination among Ute Water, grazing permittees and other users each fall. Signage may be necessary at the site in order to prevent congestion that could interfere with permittee activity.

Alternative 1

Monument #1 Reservoir:

The Proposed Action is to increase the size of Monument #1 Reservoir from the current 570 acre-feet to 4,668 acre-feet, which would inundate 147.6 surface acres. At an estimated capacity of 5.8 acres per AUM, this would be 21 AUM's of grazing land lost. Of the total 7,209 AUM's available on the allotment, this would be about 0.3 percent of the total AUM's. No fences or improvements would be directly impacted by this project. Implementing Alternative 2 would result in a 177-surface acre reservoir, affecting 30.5 AUMs.

Reclamation of Monument #2 Reservoir, which is mitigation for wetlands impacts at Monument #1 Reservoir, will temporarily deny use of approximately 709 acres. This area will be fenced in order to exclude cattle and allow the wetland complex to begin to re-establish itself. This is a loss of approximately 122 AUMs, about 1.7 percent of the total AUMs in the allotment. An estimated 2.25 miles of fence ($10,000/ mile for construction) would have to be constructed to prevent cattle from accessing the reservoir site.

Hunter Reservoir:

The Proposed Action is to increase the size of Hunter Reservoir from the current 110 acre-feet of capacity to 1,340 acre-feet. This would increase the inundated area from 19 surface acres to 117.6 surface acres. Ninety-nine acres of additional inundation would is approximately 11 AUMs, about 0.2 percent of the total AUM's. No fences or improvements would be directly impacted by this project.

Alternative 2

Implementing Alternative 2 would result in a 177-surface acre reservoir, affecting 30.5 AUMs.

Reclamation of Monument #2 Reservoir, which is mitigation for wetlands impacts at Monument #1 Reservoir, will temporarily deny use of approximately 709 acres. This area will be fenced in order to exclude cattle and allow the wetland complex to begin to re-establish itself. This is a loss of approximately 122 AUMs, about 1.7 percent of the total AUMs in the allotment. An estimated 2.25 miles of fence ($10,000/ mile for construction) would have to be constructed to prevent cattle from accessing the reservoir site.

No Action Alternative

Under the No Action Alternative, the Forest Service would not authorize the Proposed Action or any of the Action Alternatives so there would be no change to the current grazing management.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for impacts to this resource area.

Recreation Management

Existing Conditions

Recreation Access

Traveling south from Vega State Recreation Area, NFSR 262 and NFSR 280 are the access roads to Hunter Reservoir and the alternative sites. NFSR 262 begins an improved access. The quality of the roadway lowers quickly after fording Park Creek, to a resource management road which along with NFSR 280 in general, require a high-clearance four-wheel-drive vehicle or an all-terrain vehicle (ATV) (see Transportation section). The larger drainage in general has numerous constructed and managed ATV trails, generally open to off highway vehicles (OHV's) less than 50" in width. These trails are open to motorized and mechanized vehicles as well as hiker/horse use. These routes are popular throughout the snow free season for motorized recreationists, for fishing and hunting access and general forest recreation. Installation of a bridge across Park Creek in 2014 for OHV access along NFSR 260 has extended the use season to the west of the area and increased the opportunities for loop access for OHVs.

The season for snow-free recreation access is relatively short because of the high elevation of the area with access beginning in June and continuing thru October. The access route into Hunter Reservoir which exists at 10,400 feet, is complicated by poor location and proximity to the drainage with frequent unimproved stream crossings and numerous areas saturated well into the summer season

Dispersed Recreation

Dispersed recreation activities are the predominant type of recreation in the analysis area. Fishing, hiking, dispersed camping, four-wheel and OHV driving and hunting are among the recreation uses found in the area. Dispersed camping and hunting activities increase during the fall big game seasons, especially along

NFSR 262 between Vega Reservoir and the Leon Creek crossing. Snowmobiling occurs in the winter. While Hunter Reservoir's location at the end of a long, difficult access route keeps use levels at the reservoir at a lower level, the area has exhibited increased use by those seeking more difficult access and those seeking more solitude.

Winter access to the area is provided by the Sunlight to Powderhorn Snowmobile Trail. This route is one of the longest continuously marked and groomed snowmobile routes in the Continental U.S. The route begins on the Grand Mesa N.F., near to the Powderhorn Ski Area on the west, and continues across the Grand Valley District, on to the Paonia District of the Gunnison N.F., then back to the Grand Valley along the Buzzard and Owens Creek drainages until the trail crosses onto the White River N.F. and terminates above the Sunlight Ski Area on the east.

The Vega Snowmobile Trail parallels Leon Creek south from Vega Reservoir to its intersection with the Sunlight to Powderhorn (S-P) Snowmobile Trail near Monument Creek. From there, the Leroux Snowmobile Trail continues up East Leon Creek south, past Hunter Reservoir, and over the divide to Leroux Creek. Although the trail markers designate a trail around Hunter Reservoir, snowmobilers usually travel across the reservoir. These trails are under permit to be groomed and marked and represent a significant resource for winter use.

As the S-P Trail is located along Monument Creek and once past Monument #1 Reservoir, the trail follows the South Fork of Monument Creek. This area exhibits the most significant avalanche hazard known along the portion of the trail on the GMUG N.F. The drainage has a very narrow bottom, steep sides and frequent stream crossings and terrain traps which make this portion of the trail difficult to maintain. The exit from the South Fork of Monument Creek is locally known as "Phazer Hill." This section is extremely steep, with a tight curve and steep grade transition at the bottom which is difficult to make in deep powder conditions, to an abrupt grade change at the crest vertical curve at the top of the hill where the trail crosses to the next drainage south. Both trail managers and club members have long sought the opportunity to relocate this portion of the trail out of the South Fork of Monument Creek to a more favorable location which would make the route safer and easier to maintain.

Developed Recreation

There are no developed recreation areas within the analysis area. The nearest developed recreation facilities are located at Vega State Recreation Area.

Recreation Opportunity Spectrum (ROS)

The Recreation Opportunity Spectrum (ROS) is a system for describing a variety of recreation settings on NFS lands. It offers managers a tool for managing landscapes to effectively provide a range of recreation settings for visitors to experience. There are six major setting categories within the ROS system -- Urban (U), Rural (R), Roaded Natural (RN), Semi-Primitive Motorized (SPM) Semi-Primitive Non-Motorized (SPNM) and Primitive (P). As the word *spectrum* implies, they range from very developed (U) to very rustic and remote (P).

The Grand Mesa, Uncompahgre and Gunnison National Forests Land and Resource Management Plan (Forest Plan) classifies Hunter Reservoir, as well as the road access corridor (where the alternative reservoir sites are located), as semi-primitive motorized (SPM). SPM is defined as primitive roads and trails, offering a low number of encounters with other people, a subtle and limited management presence, rustic facilities constructed of native materials and a high degree of naturalness with infrequent evidence of human activity. Management activities must blend with the surrounding landscape. They might, on occasion, dominate the landscape, but should blend with the line, form, color and texture of the surrounding landscape (Forest Service 1995).

Forest Plan Management

The Project Area is covered by the Management Prescription Areas 6B and 7A. Recreation management direction is as follows:

Management Prescription Area 6B (applicable to Alternatives 1 & 2):

- Provide semi-primitive non-motorized, semi-primitive motorized, roaded natural and rural recreation opportunities.
- Provide roaded natural recreation opportunities within ½ mile of forest arterial, collector and local roads with better than primitive surfaces which are open to public travel.
- Provide semi-primitive motorized recreation opportunities with a low to moderate incidence of contact with other groups and individuals within ½ mile of designated local roads with primitive surfaces and trails open to motorized recreation use.
- Where local roads are closed to public motorized recreation travel, provide for dispersed non-motorized recreation opportunities. Manage recreation use to provide for the incidence of contact with other groups and individuals appropriate for the established ROS class.
- Provide semi-primitive non-motorized recreation opportunities in all areas more than ½ mile away from roads and trails open to motorized recreation use.

Management Prescription Area 7A (applicable to Alternative 1):

- Provide semi-primitive non-motorized, semi-primitive motorized, roaded natural and rural recreation opportunities.
- Provide roaded natural recreation opportunities within ½ mile of forest arterial, collector and local roads with better than primitive surfaces which are open to public travel.
- Provide semi-primitive motorized recreation opportunities with a low to moderate incidence of contact with other groups and individuals within ½ mile of designated local roads with primitive surfaces and trails open to motorized recreation use.
- Where local roads are closed to public motorized recreation travel, provide for dispersed non-motorized recreation opportunities. Manage recreation use to provide for the incidence of contact with other groups and individuals appropriate for the established ROS class.
- Provide semi-primitive non-motorized recreation opportunities in all areas more than ½ mile away from roads and trails open to motorized recreation use.

The recreation setting in the area currently satisfies this prescription. The existing conditions in the area meet the designated SPM classification because the setting is generally natural appearing, with limited evidence of human activity, except for Hunter Reservoir itself. The reservoir dominates the landscape but blends with the line, form, color and texture of the surrounding landscape. There is limited signage and no recreation facilities are provided. The area offers moderate to good opportunities for solitude and closeness to nature. The expectation for interacting with other people is relatively low and decreases as the route progresses south.

Environmental Consequences

Alternative 1

Recreation Access

The Proposed Action calls for improvement of the access route to Hunter Reservoir, particularly along NFSR 280, during the period of construction (covering probably two seasons). After construction is completed, the road would be allowed to return to a high-clearance, four-wheel-drive route, although certain improvements made for purposes of resource protection would be maintained (i.e., drainage structures, etc.). The route will be moved out of wet boggy areas where possible and relocated to more durable areas where drainage can be maintained, siltation and soil movement will be minimized and the route can be maintained according to Best Management Practices (BMP). A properly engineered access route will minimize environmental effect and provide for improved maintenance at a reasonable cost.

There would likely be some increase in public traffic to the reservoir during the period of improved access. It is reasonable that some level of increased use could continue even after road conditions revert to a primitive state.

The Proposed Action to improve access into the Monument #1 Reservoir would require reconstruction of the access road currently managed as NFST 518. The road was formerly a high clearance access used to construct Monument Reservoirs #1 and #2. After enlargement of Monument #1, the route may be managed for high clearance 4x4 and OHV access. NFST 518 would be relocated around the proposed enlargement, which will require the route be moved to higher ground and onto more durable, upland areas and out of areas heavily influence by wetlands. This relocation will mitigate several issues with the current location, including portions of the trail which are poorly drained, are in poor soils and wet areas.

Improvement to the Hunter and Monument #1 sites would provide an improved destination for cold-water fishing.

The Sunlight to Powderhorn snowmobile trail (NFST 740) would be relocated as part of the proposed action.

Dispersed Recreation

An enlarged Hunter Reservoir could become a more attractive recreational fishery, particularly if the Colorado Parks and Wildlife stocks the reservoir for recreational or conservation purposes. An improved fishery would undoubtedly attract more anglers, but the increase in fishing would be limited by the difficulty of access to the site.

Timber removal around existing reservoirs would also remove signage for the Leroux Snowmobile Trail. However, as indicated in the project Design features, the project proponent would consult with the Forest Service on the relocation of trail above the new high waterline of the expanded reservoir and would install new snowmobile signs around the reservoir.

Developed Recreation

No developed recreation facilities are included in the Proposed Action.

Recreation Opportunity Spectrum

Implementation of the Proposed Action would not result in an alteration of the area's Semi-Primitive Motorized (SPM) classification. Although an enlarged Hunter Reservoir would dominate the landscape, it would blend with the surrounding landscape by line, form, color and texture. The area would remain

natural in appearance, with little other evidence of human activity. Signing would be limited, and no recreation facilities would be provided. The area would continue to offer moderate to good opportunities for solitude and closeness to nature. The expectation for interacting with other people would remain relatively low, even with a slight increase in anglers, because of the difficulty and length of the road.

By maintaining the ROS classification, the Proposed Action would comply with the recreation management prescription for the area.

Alternative 2

Enlarging Monument #1 Reservoir would require reconstruction of the access road currently managed as NFST 518. The road was formerly a high clearance access used to construct Monument Reservoirs Number 1 and 2. After enlargement of Monument #1 Reservoir, the route may be managed for high clearance 4x4 and OHV access. NFST 518 would be relocated around the proposed enlargement, which will require the route be moved to higher ground and onto more durable, upland areas and out of areas heavily influence by wetlands. This relocation will mitigate several issues with the current location, including portions of the trail which are poorly drained, are in poor soils and wet areas.

Improvement to the Monument #1 site would provide an improved destination for cold-water fishing.

Dispersed Recreation

An enlarged Hunter Reservoir could become a more attractive recreational fishery, particularly if the Colorado Parks and Wildlife stocks the reservoir for recreational or conservation purposes. An improved fishery would undoubtedly attract anglers, but the increase in fishing would be limited by the difficulty of access to the site.

Timber removal around the existing reservoir would also remove signage for the Leroux Snowmobile Trail. However, as indicated in the project Design features, the project proponent would consult with the Forest Service on the relocation of trail above the new high waterline of the expanded reservoir and would install new snowmobile signs around the reservoir.

Developed Recreation

No developed recreation facilities would be impacted by the Alternative 2.

Recreation Opportunity Spectrum

Implementation of the Proposed Action would not result in an alteration of the area's Semi-Primitive Motorized (SPM) classification. Although an enlarged Monument #1 Reservoir would dominate the landscape, it would blend with the surrounding landscape by line, form, color and texture. The area would remain natural in appearance, with little other evidence of human activity. Signing would be limited, and no recreation facilities would be provided. The area would continue to offer moderate to good opportunities for solitude and closeness to nature. The expectation for interacting with other people would remain relatively low, even with a slight increase in anglers, because of the difficulty and length of the road.

By maintaining the ROS classification, the Proposed Action would comply with the recreation management prescription for the area.

No Action Alternative

Under the No Action Alternative, the Forest Service would not approve the enlargement of Hunter Reservoir or Monument #1 Reservoir, and recreation opportunities and management would not be affected.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for impacts to this resource area; however, re-routing the S-P Trail away from an avalanche prone area east of Monument #1 Reservoir (Alternatives 1 & 2) would increase the safety of winter recreation in that area.

Enlarging one or more reservoirs will result in additional high-quality fish habitat in the Leon Creek watershed. The Forest Service and Colorado Parks and Wildlife would not develop these areas in order to promote recreation; however, they would provide a back-country fishing experience that does not exist in the watershed currently. The 0.5 cfs wintertime release from an enlarged Hunter Dam (Alternative 1) could increase habitat quality in East Leon Creek and Leon Creek, which could improve the quality of the recreational fishery in these streams.

Roadless Areas

The Colorado Roadless Rule was finalized on July 3, 2012. This Rule replaces the Roadless Area Conservation Rule of 2001 in Colorado. It provides management direction for conserving and monitoring approximately 4.2 million acres of NFS lands in Colorado. The purpose of the rule is to conserve roadless characteristics for future generations and allow management activities within Colorado Roadless Areas (CRAs) that are important to the citizens and economy of the State. The Rule contains exceptions for activities such as have been proposed here. Roadless consultation has occurred between the Forest, Rocky Mountain Regional Office and the State for this project.

Existing Conditions

Two CRAs are present in the Leon Creek watershed: a portion of the Salt Creek CRA is located to the east of NFSR 262 and the Flat Tops/Elk Park CRA is located to the west of NFSR 262. Monument #1 and #2 Reservoirs and Hunter Reservoir are located within CRAs (Figure 7). NFSR 280 is outside of any CRA. Portions of NFST 518, the Leroux Creek snowmobile trail are within the Salt Creek CRA and portions of the Sunlight-Powderhorn snowmobile trail are located within the Flat Tops/Elk Park CRA.

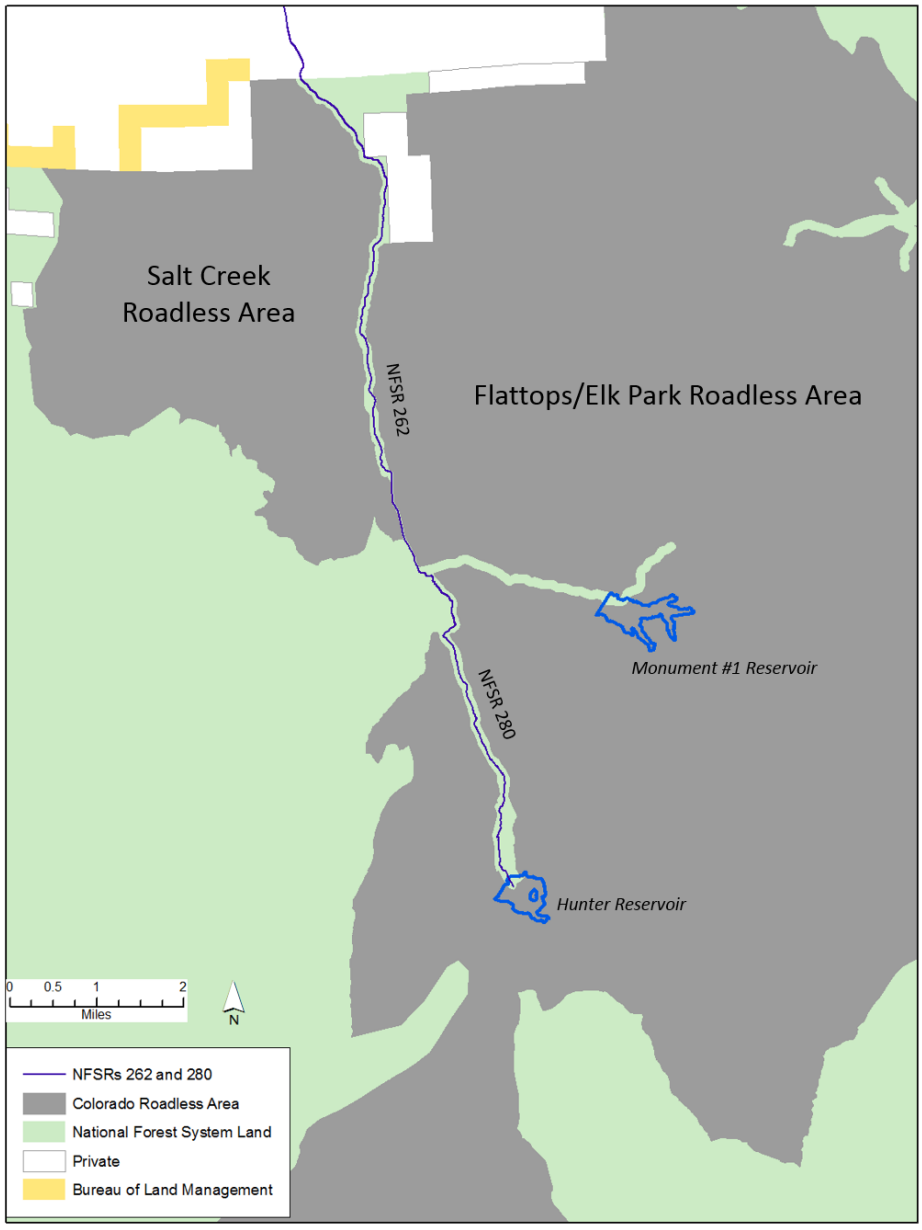

Figure 7. Roadless Areas associated with Hunter-Monument Project

Environmental Consequences

All Action Alternatives

Existing water rights at either each reservoir site allow for development including activities related to roads and incidental tree removal under the Colorado Roadless Rule exceptions. Any alternative would affect less than 1 percent of CRAs in the project area. An analysis of impacts to CRAs includes consideration of the nine Roadless Area Characteristics identified in 36 CFR 294.41 is included below.

High-quality air or undisturbed soil, water, and air: Soil effects would be localized and have been described in Soils section of this document. Effects would occur within and outside CRAs. Ground and surface water effects are described in the Water Resources and Hydrology section of this document. Providing high-quality water for municipal supply is consistent with the Colorado Roadless Rule. Short-term impacts on local air quality are expected only during construction activities and are detailed in the Air Quality section.

Public drinking water: Hunter Reservoir and Monument #1 Reservoir are existing facilities. The purpose of this project is to provide additional storage for municipal water, which includes drinking water and meeting water demand for future needs for Grand Valley. Construction activities within the Leon Creek watershed would also occur within the Source Water Protection Area of Collbran, Colorado. The Town of Collbran gets it water from springs located near town and not directly from Leon Creek or Plateau Creek; however, Collbran's springs may be fed, at least in part, by water from Leon Creek. Accidents (e.g. chemical spills) that occur during construction could affect water quality. Road improvements and restoration and re-establishment of wetlands upstream from Collbran may result in water quality improvement. Water quality and quantity analysis is detailed in Water Resources and Hydrology section of this document.

Diversity of plant and animal communities: This project will impact wildlife and habitat. Impacts to species and their physical environment are discussed in sections pertaining to Aquatic Wildlife, Terrestrial Wildlife, Vegetation, and Wetlands. The Biological Assessment and Biological Evaluation for this project are located in the project file.

Habitat for threatened, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land: This project will impact the four Endangered Colorado River fishes through water depletions and Canada lynx through removal of habitat. The USFWS has been consulted regarding these impacts, which are discussed in sections pertaining to Aquatic Wildlife and Terrestrial Wildlife, and Vegetation. More information is available in the Biological Assessment and Biological Evaluation for this project, both of which are available in the project file.

Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation: There are no primitive recreation classes designated within the project area and this aspect of Roadless Character will not be affected by the project. Mitigation activity around Monument #2 Reservoir will remove human infrastructure within a CRA thereby increasing the appeal of this area for visitors who value opportunities for recreation in areas where human influence on the land is minimized.

Reference landscapes: Roadless Areas within the Leon Creek watershed are not identified in the GMUG Forest Plan as reference landscapes for research, study, or interpretation. As such, this aspect of Roadless Character will not be affected by the project.

Natural-appearing landscapes with high scenic quality: Reservoirs and roads and trails are existing and contribute to the visual environment of the Grand Mesa. Dams constructed under Alternatives 1 and 2

would be located within areas covered by the Management Prescription 6B, as described in the Forest Plan.

The Forest Plan contains the following direction concerning visual resource management for those management prescription areas:

- 6B: General direction for visual resource management within the 6B areas calls for designing and implementing the management activities to blend with the natural landscape, to manage for the adopted visual quality objective (VQO), and implement visual resource management as outlines in management requirements. No other resource specific direction or standards and guidelines relevant to this type of project are identified in the Forest Plan.

- 7A: General direction for visual resource management within the 7A areas calls for meeting stated VQOs, managing for adopted VQOs and implement visual resource management as outlines in management requirements. No other resource specific direction or standards and guidelines relevant to this type of project are identified in the Forest Plan

Roadless units within the Project Area, as well as those areas not included in either Roadless inventory, contain several motorized roads and trails, as well as water developments (i.e., reservoirs and ditches).

The Visual Quality Objective (VQO) under the Visual Management System describes the future scenery management goal for the area. VQOs are based on the physical characteristics of the land and the sensitivity of the landscape setting. VQOs define how the landscape will be managed, the level of acceptable modification permitted in the area, and under what circumstances modification may be allowed.

These VQOs are defined as follows: the Retention (R) VQO, which is the most restrictive in the Project Area, provides only for management activities that are not visually evident. Under Retention, permitted activities may only repeat the form, line, color, and texture frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., would not be evident.

- The Partial Retention (PR) VQO provides for management activities that remain visually subordinate to the characteristic landscape. Activities may repeat the form, line, color, or texture found in the characteristic landscape, but they should remain subordinate to the characteristic landscape.

- The Modification (M) VQO allows for activities that may visually dominate the original characteristic landscape. These activities must, however, borrow from naturally established form, line, color, or texture, so that the visual characteristics are like the surrounding area. Alterations or deviations of the natural landscape should be compatible or complimentary to the overall character within the area affected.

- The Maximum Modification (MM) VQO permits the greatest visual change where human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed in foreground or middle ground.

The majority of the Project Area lies within a “Modification” VQO. A small portion of the Project Area adjacent to Monument Reservoirs are within a “Major Modification” VQO. Enlarging Monument #1 Dam and Hunter Dam would be consistent with current designations and existing Roadless character.

Traditional cultural properties and sacred sites: Existing analyses suggest cultural or sacred sites are located within the project area and this aspect of Roadless Character but will not be directly affected. Indirect effects to cultural resources may continue under any alternative. However, cultural surveys will need to be completed for the 32 acres that would be inundated by Alternative 2 this summer. The results of those surveys will be added to the project record.

Other locally identified unique characteristics: There are no locally unique characteristics within the project area, therefore, this aspect of Roadless Character will not be affected by the project.

No Action Alternative

Activities related to ongoing maintenance and operation access may continue impact roadless characteristics similar to action alternatives. This is also consistent with the Colorado Roadless Rule.

Mitigation

There is no mitigation proposed specifically for impacts to Roadless Areas. However, wetlands specific mitigation at Monument #2 Reservoir, proposed for both Alternatives 1 and 2, which is located entirely within a designated Roadless Area, will improve the characteristics of the Roadless Area. Actions that will benefit the Flattops-Elk Park Roadless Area include decommissioning of Monument #2 Reservoir, removal of the dam and associated infrastructure, and removal of the access road to the Monument #2 site. The access road is not located within the Roadless Area (Figure 7); however, removing the road will decrease the road density in this portion of the National Forest and reduce the frequency of motorized travel into the Roadless Area.

Soils

The "Soil Survey of Grand Mesa – West Elk Area, Colorado" (USDA FS and NRCS 1998) provides information on distribution of mapped soil units within the project area. This published "Soil Survey" meets National Cooperative Soil Survey Standards, and includes descriptions of soil types and their characteristics relevant to management activities.

Soil quality standards are to be applied to "activity areas" (USDA FS 2014a). The activity area is considered an appropriate geographic unit for assessing soil environmental effects, because soil productivity is a site-specific attribute of the land. Thus, the activity area is used as the geographic unit to assess soil environmental effects for all action alternatives.

Activity areas are defined as "a land area affected by a management activity," such as "harvest units within timber sale areas, prescribed burn areas, grazing areas, or pastures within allotments." For the Hunter Monument Reservoir Expansion Project, the geographic boundary for the activity area is represented by the boundaries for proposed reservoir high-water mark, locations where temporary roads would be constructed, and areas where existing system trails roads would be reclaimed.

The appropriate geographic area for soil cumulative effects analysis has been defined as the land area affected by a management activity. This is because soil productivity is a site-specific attribute of the land. Forest Service Manual 2550.5 defines soil productivity as the inherent capacity of the soil resource to support appropriate site-specific biological resource management objectives, which includes the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses. The productivity of one area of soil is not dependent on the productivity of an adjacent area of land. Similarly, if one acre of land receives soil impacts resulting from management activities and a second management activity that may affect soil is planned for that same site, then soil cumulative effects are

possible on that site. Thus, cumulative effects to soil productivity are appropriately evaluated on a site-specific basis.

The temporal scope for assessment of soil resource environmental effects includes both short- and long-term impacts. For the purposes of this analysis, short-term effects are defined as those that occur approximately within 1–50 years following proposed management actions. Long-term effects are defined as those that occur approximately within 50 years or more, following proposed management actions.

Existing Conditions

Soil characteristics develop over geologic time and are determined by the interaction of climate, vegetation, geology, relief and aspect. These factors vary across the geographic area; and, therefore, there is a range of soils that occur within the area. The rocks that underlay the top of the Grand Mesa are volcanic basalt, while the parent geology for the side slopes is dominated by sedimentary rock. The differences in parent geology determine the physical nature and property of the soils in the project area. Finer textured soils, including silty-clay loams, clay loams, and clays have developed on shale. These soils transmit water slowly and have high runoff rates. The sandstones tend to develop coarser, sandier soils such as sandy-clay loams, sandy loams, and loamy sands that have higher infiltration rates. As these sandstones and shales erode and move down slope they often mix in a colluvium of silts over sands or clays under loams. The soils on the top of the mesas tend to be well drained and deep rocky or gravelly loams associated with glacial till (Cryer and Hughes 2007).

Alternative 1

Monument #1 Reservoir

Monument #1 Reservoir is located in Mesa County, on Monument Creek, which is a tributary to Leon Creek from the east. Monument #1 Reservoir is about 8½ miles southwest of Vega Reservoir. From the paved road at Vega Reservoir, the route goes about six miles on NFSR 262 to the crossing of Monument Creek; from there, NFST 518 goes up a little over two miles to Monument #1 Reservoir.

At Monument #1 Reservoir, the existing dam is a homogeneous, gravelly clay embankment founded on glacial drift soils placed across Monument Creek.

Monument #1 Reservoirs is within the Flat Tops Pasture of the Leon Grazing Allotment, assigned for use by cattle and horses. It is under current grazing permit to the Leon Grazing Pool, comprising about thirteen individual permittees. The pastures are not fenced, but represent general areas into which cattle are directed on a rotation schedule. Big Park, Monument Creek, and the areas around both Monument Reservoirs are commonly grazed by cattle in the summertime.

The soil units at Monument #1 Reservoir have been mapped and presented in the Grand Mesa-West Elk Soil Survey (Forest Service 1998; Table 15).

Table 15. Soil characteristics around Monument #1 Reservoir, Alternative 1.

Soil Map Unit	Acres	Soil Type	Slope (%)	Landforms	Parent Material	Surface Texture
105	102	Booneville, warm – Doughspon complex	5 to 15	Slump block benches, swales	Glacial till from basalt	Very stony loam

Soil Map Unit	Acres	Soil Type	Slope (%)	Landforms	Parent Material	Surface Texture
110	4	Broad Canyon, warm-Bullbasin-Cryaquolls complex	0 to 10	Glacial benches	Glacial till from basalt	Very gravelly loam
155	16	Hayrack-Muggins-Nutras comple	5 to 40	Mountain slopes	Residuum and colluvium from interbedded sandstone/shale	Clay loam
197	<1	Wesdy-Mudbuz complex	10 to 40	Mountain slopes	Residuum and colluvium from interbedded sandstone/shale	Cobbly loam

Hunter Reservoir

Hunter Reservoir is located in the Grand Mesa National Forest in Mesa County about 11 miles south of Vega Reservoir. From the Forest boundary south of Vega Reservoir, Hunter Reservoir is accessed via NFSR 262 to the confluence of Middle and East Leon Creeks and from that point south on NFSR 280 to Hunter Reservoir. Hunter Reservoir is located in the Leon Creek watershed, near the head of East Leon Creek.

At Hunter Reservoir, the existing dam is a homogeneous, gravelly clay embankment consisting of glacial drift soils placed across East Leon Creek. It has a vertical height of 11 feet with a crest elevation at 10,364 feet, a crest width of 10 feet and crest length of 290 feet (Table 1).

The whole Hunter Reservoir project area, including the access road, is within the Leon Grazing Allotment, assigned for use by cattle and horses. It is under current grazing permit to the Leon Grazing Pool, comprising about thirteen individual permittees. The pastures are not fenced, but represent general areas into which cattle are directed on a rotation schedule. Usually only a few cattle reach Hunter Reservoir, but the roads accessing it (especially NFSR 262) are in areas where cattle commonly graze in the summertime.

The soil units at Hunter Reservoir have been mapped and presented in the Grand Mesa-West Elk Soil Survey (Forest Service 1998; Table 16).

Table 16. Soil characteristics at Hunter Reservoir.

Soil map unit	Acres	Soil type	Slope (%)	Landforms	Parent material	Surface texture
105	11	Booneville, warm – Doughspon complex	5 to 15	Slump block benches, swales	Glacial till from basalt	Very stony loam
127	62	Cryaquolls and Borohemists	0 to 10	Valley floors	Alluvium	Fine sandy loam
129	18	Cryoboralfs, Cryochrepts, and Rubble land	>65	Mountain slopes	Residuum and colluvium for basalt	Very cobbly loam

169	2	Needleton family-Cryaquolls complex	0 to 40	Glacial benches	Glacial till from mixed volcanic sources	Cobbly loam
170	<2	Needleton-Scout families complex	5 to 40	Slump block benches	Residuum and colluvium from mixed volcanic sources	Cobbly loam

Alternative 2

An enlarged Monument #1 Reservoir described in Alternative 2 is slightly larger (32 acres) than the reservoir in Alternative 1 (Table 1). The soil units have been mapped and presented in the Grand Mesa-West Elk Soil Survey (Forest Service 1998) and contain the same soil mapping units for the smaller reservoir enlargement (Table 17)

Table 17. Soil characteristics at Monument #1 Reservoir.

Soil Map Unit	Acres	Soil Type	Slope (%)	Landforms	Parent Material	Surface Texture
105	117	Booneville, warm – Doughspon complex	5 to 15	Slump block benches, swales	Glacial till from basalt	Very stony loam
110	7	Broad Canyon, warm-Bullbasin-Cryaquolls complex	0 to 10	Glacial benches	Glacial till from basalt	Very gravelly loam
155	25	Hayrack-Muggins-Nutras comple	5 to 40	Mountain slopes	Residuum and colluvium from interbedded sandstone/shale	Clay loam
197	<2	Wesdy-Mudbuz complex	10 to 40	Mountain slopes	Residuum and colluvium from interbedded sandstone/shale	Cobbly loam

Environmental Consequences

All Action Alternatives

For all action alternatives, the same types of management activities are proposed (except as otherwise noted in the following analysis), with the differences among alternatives primarily reflected in the extent and location of affected areas. Similarly and within this context, the type and magnitude of soil effects associated with each action alternative would generally be the same, with the differences among alternatives reflected in the extent and location of affected areas. For this reason, the type and magnitude of soil effects predicted as a result of proposed management actions is described in this section (i.e. “Soil Resource Effects Common to All Action Alternatives”) of the soil resource report. The extent and location of areas affected by proposed management actions are described in the Effects by Alternative table specific for each alternative.

Road Construction

Soil effects resulting from construction and use of temporary roads include removal of vegetation, compaction, degradation of soil structure, decreased infiltration and water holding capacity, reduction in organic material, accelerated surface erosion, and increased likelihood of mass failure, such as landslides or slumps. In short, road construction and use results in impacts to soil productivity. Soil erosion is of special concern because eroded material can be transported to streams, and thus impair water quality or aquatic habitat, in nearby streams. Erosion tends to be least on roads with flat grades, and most severe on routes that have steeper gradients. Sediment delivery tends to be most problematic on roads located adjacent to or crossing streams.

Cumulative Effects

A comparison of the long-term loss of soil productivity by alternative is presented below (Table 18).

Table 18. Loss of soil productivity by alternative.

	Alternative 1		**Alternative 2**
	Hunter	Monument #1	Monument #1
Productivity loss (acres)	95	123	151

Alternative 1

Monument #1 Reservoir

Ute Water would increase the height and size of Monument #1 Dam in order to expand the water storage capacity of the facility. The current reservoir footprint is 37.9 acres and would increase to approximately 155.3 acres. In addition to improvements to NFSR 262, NFST 518 which extends from NFSR 262 to the Monument #1 Dam construction site would have to be upgraded in order to support construction traffic. The upgrade to NFST 518 would be "undone" following construction and public access via motorized vehicles would be restricted to UTVs.

The main dam for the enlarged Monument #1 Reservoir would be about 80 feet high and 1,810 feet long. Soil would be disturbed during the construction of those dams and would also be used as material to construct the new dams and access roads. All natural characteristics of the soil would be altered where this occurs.

Construction and enlargement of Monument #1 Reservoir would disturb or inundate approximately 123 acres of soils. The majority of soils (approximately 102 acres) that would be directly impacted by the Monument Reservoir enlargement are *Booneville, warm-Doughspon complex* (105), ranging from 5-15 percent slopes. These soils are derived from glacial till from basalt and are very deep. They are well drained with a moderately slow permeability, have a high available water capacity and potential rooting depth of 60 or more inches. Surface runoff is medium to very rapid and the hazard of water erosion is low.

The existing access road traverses a *Booneville, warm-Doughspon complex* (105) soil unit. The proposed relocation of the access road would traverse *Booneville, warm-Doughspon complex* (105) and Wesdy-Mudbuz complex (197) soil units. The *Booneville, warm-Doughspon complex* (105) and Wesdy-Mudbuz complex (197) have a low to moderate shrink-swell and low water erosion potential. Slopes in these units are from 5 to 40%. However, the upgrading and relocation of the existing road should have little effect on these soils if BMPs are implemented.

Hunter Reservoir

Ute Water would increase the height and size of Hunter Dam to increase the water storage capacity of the reservoir from 59 acre-feet to 1,340 acre-feet (Table 1). The current reservoir footprint of 20.2 acres would increase to 79.1 acres. Construction would require upgrades to NFSR 262 extending from Vega Reservoir to NFSR 280. NFSR 280 from its junction with NFSR 262 to the Hunter Reservoir construction site would be moved out of the riparian area surrounding East Leon Creek into a new upland location.

The main dam for the enlarged Hunter Reservoir would be about 37 feet high and 1,312 feet long. There would also be two saddle dams for this proposal, and those dams would have vertical heights less than 20 feet and crest lengths less than 570 feet. Soil would be disturbed during the construction of those dams and would also be used as material to construct the new dams and access roads. All natural characteristics of the soil would be altered where this occurs.

Construction and enlargement of Hunter Reservoir would disturb or inundate approximately 98.8 acres of soils. The majority of soils (approximately 62 acres) that would be directly impacted by the Hunter Reservoir enlargement are *Cryaquollis and Borohemists* (127), ranging from 0 to 10 percent slopes. These soils are derived from an alluvium of mixed sources and are deep to very deep. They are poorly drained with a slow permeability, have a moderate available water capacity and potential rooting depth from 20 to 40 inches. Surface runoff is very slow to rapid and the hazard of water erosion is low. These soils are associated with wetlands.

The existing access road traverses a *Needleton family – Cryaquollis Complex* (169) soil unit. The access road has numerous stream or wetland crossings and would require proper drainage . The proposed relocation of the access road would traverse *Needleton-Scout families complexes* (Unit 170) and requires grading. The *Needleton family* (Unit 169) and *Needleton-Scout families complexes* (Unit 170) have a low to moderate shrink-swell potential (they are partially derived from the Wasatch formation) and low water erosion potential. Runoff can be very slow to medium in Unit 169 and medium to very rapid in Unit 170. Slopes in these units are from 0 to 40 percent. However, the upgrading and relocation of the existing road should have little effect on these soils if BMPs are implemented.

Alternative 2

Ute Water would increase the height and size of Monument #1 Dam in order to expand the water storage capacity of the facility from the current 570 acre-feet to 6,598 acre-feet. The current reservoir footprint is 37.9 acres and would increase to approximately 177 acres (Table 1). In addition to improvements to NFSR 262, NFST 518, which extends from NFSR 262 to the Monument #1 Dam construction site would have to be upgraded in order to support construction traffic. The upgrade to NFST 518 would be "undone" following construction and public access via motorized vehicles would be restricted to UTVs.

Soil would be disturbed during the construction of those dams and would also be used as material to construct the new dams and access roads. All natural characteristics of the soil would be altered where this occurs.

Construction and enlargement of Monument #1 Reservoir would disturb or inundate approximately 151 acres of soils. The majority of soils (approximately 117 acres) that would be directly impacted by the Monument Reservoir enlargement are *Booneville, warm-Doughspon complex* (105), ranging from 5-15 percent slopes. These soils are derived from glacial till from basalt and are very deep. They are well drained with a moderately slow permeability, have a high available water capacity and potential rooting depth of 60 or more inches. Surface runoff is medium to very rapid and the hazard of water erosion is low.

The existing access road traverses a *Booneville, warm-Doughspon complex* (105) soil unit. The proposed relocation of the access road would traverse *Booneville, warm-Doughspon complex* (105) and Wesdy-Mudbuz complex (197) soil units. The *Booneville, warm-Doughspon complex* (105) and Wesdy-Mudbuz complex (197) have a low to moderate shrink-swell and low water erosion potential. Slopes in these units are from 5 to 40%. However, the upgrading and relocation of the existing road should have little effect on these soils if BMPs are implemented.

No Action Alternative

There would be no change from existing conditions on soils under the No Action Alternative.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for this resource area; however, improvements to National Forest System roads and trails included in Alternatives 1 and 2 will reduce erosion and sedimentation associated with the transportation network.

Terrestrial Wildlife

Existing Conditions

Mammals

There are numerous terrestrial wildlife species that occur in the analysis area including American pika (*Ochotona princeps*) red (pine) squirrel (*Tamiasciurus hudsonicus*), yellow-bellied marmot (*Marmota flaviventris*), American beaver (*Castor canadensis*), long-tailed weasel (*Mustela frenata),* moose (*Alces alces*), coyote(*Canis latrans*), snowshoe hare (*Lepus americanus*), chipmunks (*Tamias spp.*), ground squirrels (*Sciuridae spp.*), mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), black bear (*Ursus americanus)* and several species of mice (*Peromyscus spp.*) (Fitzgerald 1994; personal observations). Most of the above species are common and have wide distributions within the region.

Migratory Birds

The Migratory Bird Treaty Act prohibits the unregulated "take" of most native bird species except gallinaceous birds. It covers direct harm to birds rather than including harm to habitat. MBTA does not exempt unintentional take of birds. Proposals that appear to risk direct damage to birds or live eggs must show diligence in avoiding or reducing this risk. The lead enforcement agency, the U.S. Fish and Wildlife Service, publishes a list, "Birds of Conservation Concern," indicating that avoiding harm to the species on this list will contribute substantially to showing diligence to the requirements of the Migratory Bird Treaty Act (Table 19). These are non-game migratory avian species that the USFWS has targeted as conservation priorities but are not currently federally listed as threatened or endangered.

Potential nesting habitat for the species in Table 19 is limited by elevation. There is breeding habitat for golden eagle, flammulated owl, Williamson's sapsucker, Swainson's hawk and northern harrier in the project area (Andrews and Righter 1992; Kingery 1998). Many other could be encountered in the area.

Table 19. Birds of Conservation Concern (BOCC) associated with project area.

Common name	Scientific name	Common name	Scientific name
Northern harrier	*Circus cyaneus*	Short-eared owl	*Asio flammeus*
Swainson's hawk	*Buteo swainsonii*	Black swift	*Cypseloides niger*
Ferruginous hawk	*Buteo regalis*	Lewis' woodpecker	*Melanerpes lewis*
Golden eagle	*Aquila chrysaetos*	Williamson's sapsucker	*Sphyrapicus thyroideus*

Common name	Scientific name	Common name	Scientific name
Prairie falcon	*Falco mexicanus*	Gray vireo	*Vireo vicinior*
Peregrine falcon	*Falco peregrinus*	Pinyon jay	*Gymnorhinus cyanocephalus*
Gunnison sage-grouse	*Centrocercus minimus*	Bendire's thrasher	*Toxostoma bendirei*
Snowy plover	*Charadrius alexandrinus*	Crissal thrasher	*Toxostoma rufum*
Mountain plover	*Charadrius montanus*	Sprague's pipit	*Anthus spragueii*
Solitary sandpiper	*Tringa solitaria*	Virginia's Warbler	*Vermivora verginiae*
Marbled godwit	*Limosa fedoa*	Black-throated gray warbler	*Dendroica nigrescens*
Wilson's phalarope	*Phalaropus tricolor*	Grace's warbler	*Dendroica graciae*
Yellow-billed cuckoo	*Coccyzus americanus*	Sage sparrow	*Amphispiza belli*
Flammulated owl	*Otus flammeolus*	Chestnut-collared longspur	*Calcarius ornatus*
Burrowing owl	*Athene cunicularia*		

Raptors

Raptors are birds of prey, which generally occupy the top of the avian food chain. During field surveys, suitable raptor nest sites, such as trees and cliffs, were searched within one-quarter mile of the alternative reservoir sites. Recorded calls of northern goshawk, and boreal owls were played around the alternative sites and along the access roads. There was no response at any site. Those raptor species for which suitable nesting habitat is present include sharp-shinned hawk, northern goshawk, red-tailed hawk, golden eagle, American kestrel, flammulated owl, great horned owl, northern pygmy owl, long-eared owl, boreal owl, and northern saw-whet owl (Andrews and Righter 1992; Kingery 1998). No active or inactive nests were found.

Invertebrate Animals

The project area includes a community of important, albeit less charismatic animal species. The invertebrate community is primarily composed of insects that inhabit aquatic and terrestrial habitats, as well as ecotones, such as riparian areas. Forest Service personnel have observed butterflies, grasshoppers, dragonflies, damselflies, ants, mayflies, and caddisflies in the area. The insect community appears to be robust, considering the elevation. There are no data suggesting one or more varieties of invertebrate are endemic to the watershed or rare, as measured by some other variable.

Federally-Listed Species

There are 18 threatened or endangered (T+E) animals and 13 T+E plants in Colorado. Species known to occur on or near the Grand Mesa are listed below (Table 20). A complete description of habitat requirements of each species and findings of field inventories for threatened, endangered and candidate species can be found in the Biological Assessment prepared for this project.

No portion of the project area has been designated as critical habitat by the Secretary of the Interior.

Most species were not analyzed in detail because they exist exclusively outside the project area, necessary habitat is absent from the project area, or there would be no effect on the quantity or quality of habitat. These species are briefly described below. Information on species status, distribution, and ecology was derived from USFWS recovery plans, USFWS habitat mapping, Colorado Natural Heritage Program maps and reports, habitat mapping by Colorado Parks and Wildlife, Forest-wide GIS lynx mapping coverage (Shenk 2005), personal knowledge, scientific studies and reports, and communication with USFWS biologists.

Table 20. Federally protected species that could be located within or adjacent to the project area.

Species	Status	Presence	Project Effects	Rationale
Black-footed ferret	Endangered	NP	NE	Not present. This species is limited to prairie dog colonies at lower elevations (Armstrong 1972). This species, nor its habitat is present in the project area.
Canada lynx	Threatened	S	NLAA	See analysis below
Gunnison sage-grouse and critical habitat	Threatened	NP	NE	Habitat not present The remaining Gunnison Sage-Grouse occur in seven populations living in the sagebrush habitats of southwestern Colorado and southeastern Utah. There is no designated critical habitat or suitable habitat in the project area.
Mexican spotted owl	Threatened	NP	NE	Habitat not present.This subspecies of the spotted owl is generally found in canyons that include Douglas fir and Ponderosa pine in southern Colorado, New Mexico, and Arizona. They have not been documented on the GMUG. Breeding ranges occur up to 8,200 feet in elevation. The project area does not contain suitable habitat.
Western yellow-billed cuckoo	Threatened	NP	NE	Habitat not present. Found in deciduous trees and shrubs at lower elevations than project area alternatives (Andrews and Righter 1992).
Uncompahgre fritillary butterfly	Endangered	NP	NE	Habitat not present. Not known to occur on Grand Mesa. No habitat near alternative reservoir sites (USFWS species profile website).

**Project effect determinations are: no effect (NE); may affect (MA); not likely to adversely affect (NLAA); likely to adversely affect (LAA). Presence determinations are: habitat not present (NP); habitat present species not expected to occur (NS); suspected occurrence (S); known occurrence (K)*

Canada lynx (Lynx canadensis)

Information on Canada lynx status, distribution, and ecology was derived from Forest-wide vegetation models developed in collaboration with USFWS (FS 2002c, as updated in 2006), information compiled in the Canada lynx Conservation Assessment and Strategy (Ruediger et al. 2000) and the lynx science report (Ruggiero et al. 2000). There are numerous location records on the Grand Mesa of radio-collared lynx released in Colorado by CPW (Shenk 2005).

Habitat for Canada lynx is found above 8,000 feet (Fitzgerald et al. 1994). Suitable lynx habitat is found in each proposed reservoir site. There are also approximately 4-5 miles of designated snow compaction routes in the project area in the form of snowmobile trails. Compacted snow may allow competitors such as coyotes and red foxes access to lynx habitat during the winter. Lynx are considered in detail in the Biological Assessment for this project.

Sensitive Species

Detailed evaluations of the potential impacts on the following species are discussed in the Biological Evaluation (BE; in project file): American Marten, pygmy shrew, wolverine, three-toed woodpecker, boreal owl, northern goshawk, northern harrier, ferruginous hawk, olive-sided flycatcher, boreal toad, and northern leopard frog.

Management Indicator Species (MIS)

MIS are those species that have been selected to represent the habitat needs of a larger group of species requiring similar habitats (Table 21). The GMUG maintains assessments for all MIS species found on the Forest. MIS are considered in detail in the Management Indicator Species Assessment for this project.

Table 21. Management Indicator Species (MIS) and Region 2 Sensitive Species.

Species	Presence	Effects	Population Trend, Rationale
Mammals			
Abert's squirrel	S	NI	Scope and duration of the project will not cause a loss of species viability range-wide
American Marten	S	NI	Scope and duration of the project will not cause a loss of species viability range-wide
Elk	S	NI	Scope and duration of the project will not cause a loss of species viability range-wide
Birds			
Brewer's sparrow	NP	NI	Habitat not present
Merriam's Wild turkey	NP	NI	Habitat not present
Northern goshawk	S	NI	Scope and duration of the project will not cause a loss of species viability range-wide
Red-naped sapsucker	S	NI	Scope and duration of the project will not cause a loss of species viability range-wide

Environmental Consequences

Wildlife species will likely be impacted by increased noise, traffic and human presence during road and reservoir construction activities. Such activities would cause some species to move away from the disturbance. Others could be directly impacted by collisions with vehicles and destruction of dens, burrows, and nests by earth-moving activities. Alternative 1 would result in the permanent loss of approximately 213 acres of terrestrial wildlife habitat.

If the project results in an improved reservoir fishery in one or more reservoirs, it may increase the number of people traveling there to fish. Sustained increased human traffic would make the area less attractive to some species, such as elk.

Action Alternatives

Terrestrial wildlife species would be impacted by increased noise, traffic, and human presence during construction. Work on the roads and trails would be completed prior to beginning work on Monument #1. Work on Monument #1 Reservoir (in both Alternatives 1 and 2) is expected to take 3-4 years. Under Alternative 1, Hunter Reservoir would follow Monument #1 and is expected to last 3-4 years. Therefore, work could be ongoing for 7-9 years. Prolonged construction activity is likely to cause some species to temporarily or permanently move away from the disturbance. Other species could be directly impacted by collisions with vehicles and destruction of dens, burrows, and nests by earth-moving activities. A pika population was observed in the area where basalt boulders would be mined for rip-rap. Pika habitat in that area would be impacted as a result of removing this material.

Vegetation removal would cause a reduction in carrying capacity of the area and the project would result in the permanent loss of some terrestrial wildlife habitat. Between 177 and 213 acres of terrestrial landscape would be affected by action alternatives (Tables 22-23).

Table 22. Habitat impacts at Monument #1 Reservoir.

Habitat Type	Alternative 1, 5,267 AF	Alternative 2, 6,598 AF
Aspen	0	0
Grass/Forb/Shrub	81.9	99.3
Spruce/Fir	15.9	24.8
Willow/Riparian	16.4	19.5
Rock/Scree	0	0
Current Reservoir	33.4	33.4
New Habitat Affected	114.2	177

Table 23. Habitat impacts at Hunter Reservoir.

Habitat Type	Long-Term Disturbance
Aspen	0
Grass/Forb/Shrub	67.4
Spruce/Fir	15.3
Willow/Riparian	14.3
Rock/Scree	1.8
Current Reservoir	18.7
New Habitat Affected	98.8

Federally listed species

There will be no additional snow compaction and minimal potential for the permanent increase in human activity as a result of the proposed action. However, Alternative 1 would inundate approximately 32 acres of potential lynx habitat and carrying capacity would be reduced proportionally. The larger Monument #1 alternative would inundate 25.7 acres of lynx habitat. There are recent records of lynx use of the area. Therefore, the determination for all action alternatives is “may affect, is likely to adversely affect the Canada lynx” determination.

Detailed analysis of impacts to federally listed species is discussed in detail in the Biological Assessment.

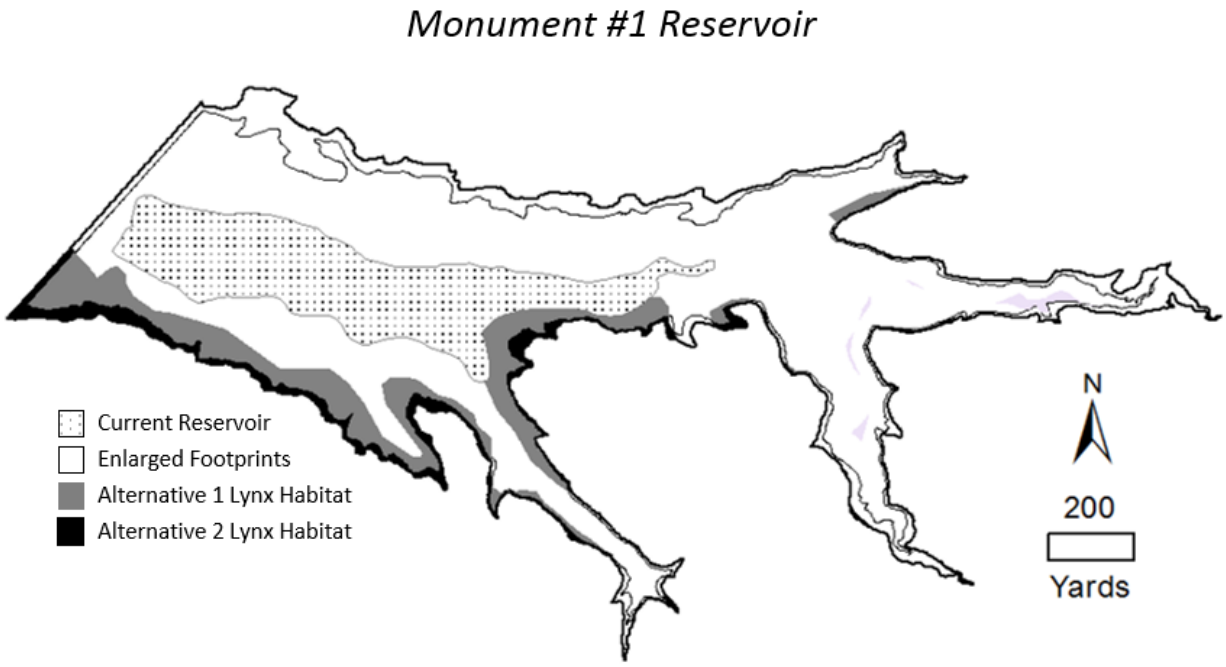

Figure 8. Lynx habitat at Monument #1 Reservoir affected by Alternatives 1 and 2. In addition to the area denoted by black shading, Alternative 2 would inundate all of the lynx habitat affected by Alternative 1.

Consultation for federally listed species was completed on September 15, 2016. The USFWS concurred with the Forest Service's determinations. The USFWS letter is located in the project file.

Sensitive species

Sensitive species are analyzed in detail in the Biological Evaluation. The project will result in minor decreases in habitat available for some species (Table 24). The most significant impact to Sensitive Species that occur near the proposed action area will be from construction and construction traffic.

Table 24. Effect determinations for Forest Service Sensitive Species in project area.

Species	Hunter Reservoir	Monument #1, 4,668 AF/Monument #1, 6,008 AF
American marten	MAII	MAII
Pygmy shrew	MAII	MAII
Bald eagle	BI*	BI
Olive-sided flycatcher	MAII	MAI
Northern goshawk	MAII	MAII
Flammulated owl	NI	NI
Northern harrier	MAII	MAII

Species	Hunter Reservoir	Monument #1, 4,668 AF/Monument #1, 6,008 AF
Boreal toad	MAII	MAII
N. leopard frog	MAII	MAII

*NI- No impact
*MAII –May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.
*BI- Beneficial impact

Sensitive Species effects are very similar to Alternative 1, except for those species associated with aspen habitat, Northern goshawk, flammulated owl and purple martin. These three species would have a determination of "**may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing."**

MIS

Species for which habitat is present are analyzed in detail. They are elk, marten, red-naped sapsucker, and northern goshawk. During fieldwork, elk and their sign were observed regularly. Marten were not observed, but habitat appears favorable (Fitzgerald et al. 1994). The same is true for northern goshawk (Andrews and Righter 1992). There are probable breeding records for goshawk near the project area (Kingery 1998). Dominant vegetation around Monument #1 Reservoir and Hunter Reservoir is Engelmann spruce and subalpine fir. Aspen is rare. There is suitable habitat for red-naped sapsucker in Big Park.

Elk: A minor reduction in summer range and an increase in disturbance for elk due to construction of the reservoirs and roads along with related vehicle traffic and other human activity. Alternative 1 is not expected to reduce the elk habitat effectiveness index below the current 0.54 for the Data Analysis Unit (DAU).

Marten: all action alternatives will result in a slight decrease in available habitat for American marten. Construction and road traffic will likely disturb marten in the area.

Red-naped sapsucker: a slight decrease in available habitat for red-naped sapsucker will occur as a result of all action alternatives.

Decreases in or alteration of habitats are not likely to have measurable effects on MIS species. This project may temporarily displace or alter how individuals use affected habitats through habitat alteration or disturbance, but these effects will not result in a change in population numbers or trends at the project or forest-wide scales.

No Action Alternative Environmental Consequences

Under the No Action Alternative, the Forest Service would not approve the enlargement or construction of any reservoir, and terrestrial wildlife species would not be affected.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for this resource area.

Transportation

Existing Conditions

NFSR 262

NFSR 262 is a one-lane road designated as open to full-sized vehicles and ATVs within the Grand Mesa Travel Management Plan. The road is accepted by the public as a level 2 route with conditions wavering from sedan-accepting surfacing in the first few miles to segments of high clearance four wheel drive challenges of rock and sinkholes.

The first 1.3 miles of this route, which is located on private land, has been surfaced with rock more than any other stretch of the road. Though maintenance provided within an agreement with the Mesa County Road and Bridge Department (the County) is apparent, the route shows its share of wear, with potholing, edges of large rocks protruding up from the surface, the "width sprawl" a road experiences as travelers try to avoid these rough areas by going off route, and lack of the ditches that help define the traveled way.

Rock surfacing has been applied fairly consistently by the county for about 1.5 miles from the forest boundary. Beyond this point, the road becomes a high-clearance four-wheel-drive route, with little rock surfacing, occasional mud holes, rocky stretches and stream fords.

NFSR 262 is a Level 2 road, which is a designation to roads "assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or specialized uses. Log haul may occur at this level."

Grand Mesa National Forest Special Order #01-2005 states that the road is closed to motorized vehicles over 50" width (except snowmobiles) to protect soft roadbed from December 1 to May 30 each year. Snow accumulation typically closes this route, and currently there is no effective physical barricade on location for this seasonal closure.

During the winter months, NFSR 262 is a marked snowmobile route extending to NFSR 280 and over to the Leroux Creek Trailhead. The only section of this trail that is groomed is the portion from the Leroux Creek Road south to the forest boundary. A marked snowmobile trail over the Flat Tops branches off from this snowmobile route. Also the route in the vicinity of Hunter Reservoir connects to the well-known and groomed Sunlight-Powderhorn Snowmobile Trail.

NFSR 280

NFSR 280 is a one-lane road designated for full-sized 4WD vehicles and UTVs. The road surface is predominantly native material. Travel on the road, especially with full-sized vehicles, is difficult. There are segments of the road that cross flat terrain where the road lacks adequate sideslope, drainage is nearly nonexistent, and rutting within the travelway is ubiquitous. Approximately one mile north of Hunter Reservoir, the road travels in and out of a wetland. Crossing this wetland can present serious problems to travelers; and, as a result, vehicles have created alternate routes around and through the wetland, resulting in several unauthorized routes. NFSR 280 crosses East Leon Creek and several tributaries. Most of the crossings are wide and lack characteristics of functional low-water fords. The road also traverses areas of boulders, which are difficult even for UTVs.

NFSR 280, like NFSR 262, is a Level 2 road.

Under Grand Mesa National Forest Special Order #01-2005 Attachment C, NFSR 280 is closed to motorized vehicles over 50 inches in width (except snowmobiles) to protect the soft roadbed from December 1 to May 30 annually. The road is typically closed by snow and currently has no effective physical barrier in place to block access under the seasonal closure.

NFSR 280 is also designated, marked and groomed as a snowmobile route, which is open to snowmobiles throughout the winter. The route begins at the Leroux Creek parking lot, intersects the S-P snowmobile trail near Monument Creek and then continues to Vega Reservoir. The snowmobile trail is marked along its route. Although the markers go around Hunter Reservoir, travel appears to usually go across the reservoir instead of around it.

NFST 518

NFST 518 begins at NFSR 262, south of Big Park and is located along Monument Creek (Figure 2). Relocation of a portion of NFST 518 around a wetland located near NFSR 262 would facilitate a drier route capable of being maintained. Given the volume of material to be hauled into the site during reconstruction of Monument #1 Reservoir, the route must be relocated to place the road on dry, durable soil.

Environmental Consequences

Action Alternatives

Design features will be used by all action alternatives (see Appendix A). Design elements for construction and reconstruction and maintenance will rely heavily on the direction found within the American Association of State Highway and Transportation (AASHTO) Guidelines for Geometric Design of Very Low Volume Roads. These guidelines are pertinent to roads with an average daily traffic of 400 trips or less.

Some of the related construction traffic impacts may generally require the expansion of the road template from a single to a double lane and curve widening to safely accommodate long commercial vehicles.

Additionally, the increase in the thickness of the gravel surfacing to support the marked increase in the quantity and frequency of axle loadings associated with heavy construction traffic will raise the grade of existing roads. The structural needs of the routes are based upon the quantity of Equivalent Single Axle Loadings (ESALs) that will be projected by the proponent. Individual axle loadings in excess of highway standards will not be allowed (20,000 lbs per axle). Generally where surfacing thickness is required, there may be an increase in the width of the existing roadway to provide for adequate lane widths. Areas of new disturbance should be minimal but necessary to construct a surfacing section capable of carrying heavy construction axle loads without undue damage to the surrounding resources, road beds and other transportation system infrastructure. Standardized design procedures provided by the proponent and reviewed by a Forest Service Professional Engineer shall be used to match field conditions.

Project effects include increased traffic loading and potential increased sediment movement due to soil disturbance from road maintenance and reconstruction. Increased traffic volume of construction and commercial vehicles will cause a rapid degrading of the road surface, especially where the current road surface has an existing rock surface. Statistics show that road surface degradation from one large semi-truck trip is equal to that of approximately 10,000 passenger vehicles. This will have a negative effect on the comfort and safety level of all road users, particularly on NFSR 262, where the first 1.3 miles includes rock surfacing. Here the road invites more traffic at higher rates of speed. Both roads would experience impacts consistent with more and heavier traffic, including higher incidence of rutting, potholing, road width expansion, and the creation of alternate parallel routes.

Increased traffic volume means vehicle speeds should be limited to 25 miles per hour. Active enforcement will be required to maintain safety during and after roadway construction and dam construction activities, especially during peak traffic periods.

Project effects will be noticeable and sometimes inconvenient to recreation activities, local users and wildlife. Some visitors would choose to accept minor delays, speed reduction and inconveniences associated with project-related construction activity, other users may temporarily choose to recreate in other parts of the National Forest that offer similar recreational experiences. Areas like Buzzard-Hightower or Brush Creek drainages may see an increase of visitors because of this. Depending on the intensity of haul and construction, NFSR 280 could be closed temporarily during construction work.

Long-term effects should remain minimal, as post-project traffic volumes are projected to average 5 or less vehicles per day. Service vehicle access for reservoir maintenance will be administered within the conditions of the road use permit (RUP) and will be analyzed on a case-by-case basis.

The effectiveness of standards required for the maintenance levels will be based on recognized AASHTO design features provided by the proponent and reviewed by the Forest Service. Use of specified materials and required construction practices for road improvements will provide the best possible performance of the roadway under heavy construction traffic and loadings, especially during saturated conditions.

The projected increase in ADT over the life of this project will result in a substantial increase in total vehicular traffic impacts, particularly with regard to heavy construction traffic. Upgrades to geometry, structural loading capacity and surfacing sections, such as realignment, curve widening, addition of roadway width, rehabilitation of drainage structures and increase in aggregate depths as well as other design and construction techniques will be required to complete this project while minimizing long-term adverse effects on the transportation system.

Safety of the traveling public during this project will be of paramount concern. To safely accommodate construction traffic and public traffic, while minimizing inconvenience to the public, the proponent shall provide and adhere to a Traffic Control Plan and Safety Plan. The proponent will use all applicable traffic control devices and traffic mitigation best management practices that are applicable to provide for the safe passage of traffic in and around the work zone.

Improvements to the roads made as a part of all action alternatives would reduce the Forest Service maintenance burdens. The proponent would have sole responsibility for road maintenance during the reservoir construction work and subsequently share in the on-going maintenance, under a RUP, during the life of the project. Under the RUP, the proponent would also comply with seasonal road closures and restrictions during springtime when roads are most vulnerable to rutting and other damage.

Engineered, hardened fords are the preferred method of stream crossing to accommodate the expected construction related traffic on Forest Service roads. If culverts are deemed necessary for construction traffic, they will be pulled and replaced with engineered, hardened fords after project completion. After construction has been completed the road will be allowed to return to a four-wheel-drive, high-clearance route. Development of the road for commercial purposes will be minimal from the Monument Trailhead south.

Drainage work would be required on NFSR 262 and NFSR 280, including pulling ditches, cleaning or replacing culverts, and establishing a cross slope where necessary to divert the water from the road surface. Surface rock application of coarse 3” minus material will be needed in areas that are soft for heavier and more traffic expected within this project.

NFSR 280 would require most reconstruction with improvements required at 26 points. Most improvements would include reconstructing steep approaches to creek crossings to provide a more gradual approach to stream crossingsd, improving cross drainage by constructing approximately 40 rolling dips and lead-out ditches within and adjacent to the current road prism, removing extreme dips and bumps, applying rock to perpetual soft areas of the road, defining and hardening small stream crossings, and relocating portions of the road upslope out of wetland areas. A few user-created duplicate routes would be blocked to prevent unauthorized travel adjacent to NFSR 280. Ten or more rolling dips would be reconstructed to aid in road surface drainage between the forest boundary near Vega Reservoir and the Leon Creek Crossing on NFSR 262. Curve-widening may be required in areas where longer trailering is needed to transport equipment, materials and supplies, particularly on NFSR 280.

Approximately 0.9 miles of NFSR 280 would be relocated to move the road out of wetlands. The new road would approach Hunter Reservoir from an upland location and join NFSR 280 a few hundred feet from the reservoir. (Figure 5). The road would be designed to Forest Service standards and specifications and would have a predominantly native surface with surface drainage structures and roadbed stabilization shown on required drawings. The design shall show grades, structures, cross sections and alignments for the route.

The abandoned portion of NFSR 280 would be re-vegetated, barricaded from vehicles and fenced off from cows upon project completion.

The relocation of NFSR 280 to a higher and more drained location takes the road into an area that is predominantly forested. Snowmelt would be slower here, with drying of the road surface taking place much later than the existing road located in open wet meadow. To reduce the tendency of some travelers to use this segment of the road before it is sufficiently dry, a seasonal closure gate on NFSR 280 would be installed as close to Hunter Reservoir as possible. The road would be closed to all motorized travel for one to two weeks after the other portions of the road are open to motorized vehicles. A sign depicting the expected closure dates and reason for the closure would be installed.

A cattle guard would be installed within the range allotment fence just east of the Leon Creek crossing and west of the Monument ATV Trailhead (Figure 2)**.** The existing allotment fence would be relocated to the north.

Material hauling and truck trips for road improvements and dam construction are estimated below (Table 24). The majority of construction and fill material for Hunter Reservoir are available at the site. However, some material will need to be imported, and this would result in the need for about 1,056 roundtrips by 25-ton end dump trucks to bring in the material. More typical vehicles carrying crews and supplies would also use the road for access for construction of the reservoir and related road work. The estimated number of crew vehicles will vary depending on the phase of the project but will amount to anywhere from 6 to 12 vehicles per day, traveling into and out from the work site over the life of the project. Construction crews could use as many as 20 vehicles and make an average of 15 trips per day along NFSRs 262 and 280, and NFST 518.

Road use permitting is required for all commercial uses. A permit would not be issued until all required construction and reconstruction documents are submitted by the commercial user, reviewed, and approved by the Forest Service. At the pre-construction meeting and after the initial plan has been approved by the Forest Service, a Road Use Permit would be issued. An approved traffic control plan is required and will be a component of the permitting for road use.

No Action Alternative

Under the No Action Alternative, current management plans, travel and otherwise, would continue to guide management of the roads in the project area. The proposed reservoir enlargement would not be done; however, Hunter Reservoir would still exist as it currently does and would still require access for the reservoir's operation and maintenance. NFSR 262 and NFSR 280 would be routinely maintained by the Forest Service or in agreement with Mesa County in a condition to accommodate intended use as safely as possible and in accordance with maintenance criteria documented in the road management objectives considering funding and use, or otherwise be maintained by entities under road use permitting. In addition, there may be some reconstruction or decommissioning activities related to other projects funded by other sources taking place in the project area. Ongoing public and permitted road uses would continue.

Segments of NFSR 262 and NFSR 280 currently exhibit poor conditions that are conducive to the amount and type of travel on remote forest roads that are located in easily rutted soils that experience abundant precipitation. Maintenance, and especially reconstruction to bring the road up to Forest Service Standards adopted from AASHTO requirements would be done as funding becomes available. Postponing these improvements would enable negative resource conditions to continue and may jeopardize public safety.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for this resource area. However, road construction and maintenance work associated with Alternatives 1 and 2 is expected to benefit the transportation network in the Leon Creek watershed. Alternative 2, the Forest Service's preferred alternative, does not include improvements to NFSR 280. In a meeting on May 8, 2017, the Forest Service and Ute Water agreed that should Alternative 2 be implemented, improvements to NFSR 280 could serve as compensatory mitigation for impacts to wetlands and this work benefit the transportation network in the watershed.

Vegetation-Native and Non-native Species

Existing Conditions

General Vegetation

The vegetation descriptions in this section are based on the detailed ground cover mapping by the Forest Service. Because ground cover consists of water, bare soil, and rock as well as vegetation, the Forest Service database uses the term "cover type" rather than "vegetation type." The database lists dozens of cover types for the Project Area, the cover types have been aggregated to describe broad vegetation types. Four types have been defined: willow/riparian, spruce/fir, aspen and grass/forb/shrub.

Near Hunter Reservoir, willow is almost exclusively planeleaf willow (*Salix planifolia*), but composition gradually changes to mountain willow (*Salix monticola*) and Geyer willow (*S. geyeriana*) downstream. Wolf willow (*S. wolfii*) is present at one location along East Leon Creek. There is less than 0.02 acres of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) in riparian areas.

Non-riparian cover types containing Engelmann spruce or subalpine fir were aggregated into a spruce/fir category. The Aspen *(Populus tremuloides)* category tended to be more uniformly the single species than the other aggregates.

Non-riparian areas covered by grasses, forbs and scattered shrubs, including some willow, were combined into the category grass/forb/shrub. The non-willow shrub component is usually shrubby cinquefoil (*Pentaphylloides floribunda*). Patches of willow present may be any of the four species listed above. The

order in which the vegetative types are presented (grass/forb/shrub) is not intended to suggest relative percent of cover.

There are extensive wetlands at Hunter Reservoir and alternative sites and smaller wetlands along roads. Wetlands feature a variety of vegetation types, but grass/forb/shrub is the most common, followed by willow/riparian. Wetland types include wet meadows, littoral zone (the area between the high and water marks), fen (peatland), and fringe wetlands at stream crossings. Willow/riparian habitat is displayed separately in vegetation tables.

Invasive/Non-native Plants

Several species of non-native plants are present in the Project Area including dandelion (*Taraxacum officinale*), smooth brome (*Bromopsis inermis*), orchard grass (*Dactylis glomerata*), and meadow foxtail (*Alopecurus pratensis*). Noxious weeds are alien, introduced, or exotic undesirable species that out-compete native species. Federal and State law prescribe that noxious species must be treated to control or remove them from the landscape. Equipment or material brought from other locations can spread noxious weed species. No species listed as noxious were found within project areas. However, the noxious species oxeye daisy (*Leucanthemum vulgare*), chamomile (*Matricaria perforata*), yellow toadflax (*Linaria vulgaris*), Canada thistle (*Cirsium arvense*), and musk thistle (*Carduus acanthoides*) are present along NFSR 262.

Environmental Consequences

Action Alternatives

Approximately 213 acres of vegetation and rock habitats would be affected by Alternative 1 and 177 acres by Alternative 2. Some vegetation would be restored surrounding the dams, temporary roads, and temporary use areas. However, approximately 198 acres would be permanently inundated by Alternative 1 and 177 by Alternative 2 (Table 25).

Table 25. Habitat impacts at Monument #1 Reservoir and Hunter Reservoir.

Habitat Type	Monument #1, Alternative 1	Monument #1, Alternative 2	Hunter Reservoir, Alternative 1
Aspen	0	0	0
Grass/Forb/Shrub	81.9	99.3	67.4
Spruce/Fir	15.9	24.8	15.3
Willow/Riparian	16.4	19.5	14.3
Rock/Scree	0	0	1.8
Current Reservoir	33.4	33.4	18.7
New Habitat Affected	114.2	177	98.8

All trees would be removed from within the high water line of any enlarged reservoir. Implementation of a Noxious Weed Management Plan and other design features would prevent the spread of noxious weeds**.**

No Action Alternative: Under the No Action Alternative, the Forest Service would not approve the enlargement of Hunter Reservoir or any of the alternatives, and vegetation would not be affected.

Special-status Plant Species

Existing Conditions

The USFWS lists 13 plant species in Colorado as either threatened or endangered. Two threatened species are present on the Grand Valley Ranger District: Debeque phacelia and Colorado hookless cactus. Neither species is present in the project area.

There are eight plant species present on the Grand Valley Ranger District included on the Region 2 Sensitive Species List (Table 26).

Table 26. Special-status plant species in the project area.

Species	Habitat present?	Description
DeBeque phacelia ***Phacelia scopulina var submutica***	No	4,700-6,200 feet, steep clay slopes in the Wasatch Formation.
Harrington's beardtongue ***Penstemon harringtonii***	No	6,800-9,200 feet in open sagebrush or, less commonly, pinyon-juniper habitat. Not documented in Mesa or Delta County.
Lesser bladderwort ***Utricularia minor***	Yes	Fen wetlands above 10,000 feet.
Lesser panicled sedge ***Carex diandra***	No	Fen wetlands, calcareous meadows 6,100-8,600 feet.
Rocky Mountain thistle ***Cirsium perplexans***	No	Shale slopes 4,500-7,000 feet. Rocks, cliffs, and canyons.
Slender cottongrass ***Eriophorum gracile***	Yes	Fens, 8,000-12,000 feet
Sun-loving meadowrue ***Thalictrum heliophilum***	No	Sagebrush and pinyon-juniper habitat in undeveloped soils, light colored clays with shale fragments; 6,300-8,800 feet.
Wetherill milkvetch ***Astragalus wetherillii***	No	Big sagebrush and pinyon-juniper habitat. Steep slopes, canyon benches, and talus below cliffs. Sandy clay soils, shale and sandstone 5,250-7,400 feet.

Environmental Consequences

All Alternatives

There are no known fen wetlands at the Monument #1 Reservoir site. Construction activities at these sites would have **No Impact** on Lesser Bladderwort or Slender Cottongrass. The fen at Hunter Reservoir has been sampled at several locations (WestWater Engineering, 2009; Austin and Cooper, 2015) and Lesser Bladderwort and Slender Cottongrass were not observed. Based on these studies inundating the fen at Hunter Reservoir would have **No Impact** on Lesser Bladderwort and Slender Cottongrass.

Lesser Bladderwort and Slender Cottongrass have not been observed at Monument #2 Reservoir, Jensen Reservoir, or the fens adjacent to Jensen Reservoir. Activities at these locations, by which reservoir infrastructure would be removed and wetlands would be re-established would have **No Impact** on these species.

Summary of Mitigation and Beneficial Effects

There is no mitigation proposed for this resource area; however, for both Alternatives 1 and 2, Ute Water has proposed substantial mitigation for wetlands impacts that will benefit vegetation characteristics in the watershed.

Water Resources and Hydrology

Existing Conditions

Leon Creek Watershed

The confluence of Leon Creek and Plateau Creek is approximately 0.5 miles downstream from Vega Dam. The Leon Creek watershed includes several perennial tributaries to Leon Creek. Perennial tributaries include Youngs Creek, Ranger Creek, Muleshoe Creek, Monument Creek, and East, Middle, and West Leon Creeks. The watershed area of Plateau Creek at its confluence with Leon Creek is approximately 80 square miles, approximately 45 square miles of that is encompassed by the Leon Creek watershed.

The water rights database of the Colorado Division of Water Resources[4] identifies four water diversions on Leon Creek. All of these are located in the most downstream 2 stream miles of Leon Creek. There are four major reservoirs in the Leon Creek watershed. The reservoir on Kenney Creek stores approximately 87 acre feet of water. Approximately 0.5 square miles of the Leon Creek watershed drains into Kenney Creek Reservoir, which is approximately 1 percent of the total watershed area of Leon Creek. Colby Horse Park Reservoir is located on Middle Leon Creek and stores approximately 446 acre feet of water. The watershed area of Colby Horse Park Reservoir is approximately 2.4 square miles, approximately 5.3 percent of the total watershed area of Leon Creek. Hunter Reservoir is located on East Leon Creek and stores approximately 59 acre feet of water (Table 1). Approximately 1.5 square miles of the Leon Creek watershed drains into Hunter Reservoir, which is approximately 3.3 percent of the total watershed area of Leon Creek. Monument #1 Reservoir is located on Monument Creek and has a decreed storage volume of 572 acre feet of water. Approximately 4.1 square miles of the Leon Creek watershed drains into Monument #1 Reservoir, which is approximately 9 percent of the total watershed area. There are several other smaller reservoirs and water developments in the watershed. Leon Lake is a natural lake located in the headwaters of Middle Leon Creek.

Between the most upstream diversion on Leon Creek and the four reservoirs listed above there are approximately 32.5 miles of un-dammed and un-diverted, perennial streams. This is approximately 75 percent of the total perennial stream miles in the Leon Creek watershed. The area of the Leon Creek watershed that is associated with the 32.5 miles of un-dammed and un-diverted perennial streams is 33.2 square miles, which is 74 percent of the Leon Creek watershed and approximately 41 percent of this portion of the Plateau Creek watershed.[5]

Estimates of average annual discharge at the mouth of Leon Creek range from 62 to 66 cfs; however, for 90 percent of an average year discharge is 7-9 cfs. The hydrograph of Leon Creek is typical of mountain streams. Discharge is lowest in February (11 cfs) and greatest in June (280 cfs; Table 27). Prediction errors for these estimates are approximately 50 percent. Using data from StreamStats, the total water volume discharged by Leon Creek is approximately 46,309 acre feet.

[4] Accessed online on August 9, 2016.
[5] The combined watershed are of Plateau Creek and Leon Creek upstream from their confluence.

Groundwater recharge, whether through hyporheic (surface and ground water mixing) discharge or true groundwater, is considerable throughout the watershed. East Leon Creek, directly downstream from Hunter Dam, maintains perennial flow throughout the years and observations at the site suggest that when the reservoir is filling no more than 200 to 300 feet of the stream is de-watered. Similar observations have been made in Monument Creek, downstream from Monument #1 Dam.

Water Rights

Ute Water has the right (July 28, 1902) to store 110 acre-feet of water in Hunter Reservoir and proposes to increase the total storage capacity of the reservoir by an additional 582 acre-feet, based on a conditional water right (July 24, 1952) at the Hunter Reservoir location. Alternative 1 calls for transfer of an additional 648 acre-feet from a 5,650 acre-feet conditional storage right (September 17, 1970). Ute has the right (May 1, 1951 & October 18, 1961) to store 573 acre-feet of water in Monument #1 Reservoir and proposes to increase the total storage capacity of the reservoir by an additional 4,682 acre-feet, based on a conditional water right (July 1, 2005) at Monument #1 Reservoir. Alternative 1 calls for Ute to transfer the 254 acre-feet of water currently stored in Monument #2 Reservoir (May 1, 1951 & August 25, 1954) to the newly-enlarged Monument #1 Reservoir.

Monument #1 Reservoir

The Monument Creek watershed, upstream from the confluence with East Leon Creek encompasses an area of approximately 6.5 square miles. Monthly discharge in Monument Creek ranges from 1.5 cfs in February to approximately 57 cfs in June (Table 24). Prediction errors for these values range from 46 to 50 percent, so the February discharge could be reasonably estimated to be as low as 0.7 cfs and the June discharge could be as high as 77 cfs. Flood discharge estimates are not available for Monument Creek. However, flood discharge is proportional to watershed area so these values could be reasonably estimated to be 50-75 percent of the values for East Leon Creek (see above). The annual water yield from Monument #1 Dam, according to USGS StreamStats, is 5,591 acre feet. Ute Water extrapolated annual water yield of the same area from estimates derived from hydrological studies of East Leon Creek (D. Priske, Ute Water Conservancy District, personal communication). Their estimate was 6,573 acre feet.

Hunter Reservoir

The East Leon Creek watershed, upstream from the confluence of East Leon Creek and Middle Leon Creek encompasses an area of approximately 11 square miles. Monthly discharge in East Leon Creek ranges from 2.9 cfs in February to approximately 97 cfs in June (Table 24). Prediction errors for these values range from 46 to 51 percent, so the February discharge could be reasonably estimated to be as low as 1.8 cfs and the June discharge could be as high as 140 cfs. Two, 50, 100, and 500-year flood events in the watershed are 208, 405, 440, and 513 cfs, respectively (33-49 percent prediction errors). Analysis of flow duration (the proportion of time stream discharge is equal to or greater than a certain value) reveals discharge at the mouth of East Leon Creek is greater than 1.7 cfs approximately 90 percent of the time. This estimate has a prediction error of 85 percent.

At its confluence with Monument Creek (the area called Big Park) the East Leon Creek watershed is approximately 18 square miles and hydrologic parameters estimated for the stream at this point are correspondingly greater. The hydrographic pattern; however, is identical. Monthly discharge is lowest in February and greatest in June. The average annual discharge is 34.2 cfs but flow duration data show this value is exceeded less than 25 percent of the year. Two year flood discharge is 319 cfs and the 500-year flood discharge is 762 cfs. Prediction errors for flood discharge estimates range from 33 to 49 percent. Based on StreamStats, the water yield at Hunter Dam is 2,962 acre feet, the water yield at the mouth of East Leon Creek is 23,634 acre feet, and the water yield at Big Park downstream from Monument Creek, is 40,233 acre feet. The annual water yield at the mouth of Leon Creek is 46,309 acre feet, which means

approximately 87 percent of the total discharge of Leon Creek is derived from the watershed upstream of Big Park.

Table 27. Monthly discharge estimates (cfs) for four streams in the project area, based on USGS StreamStats.

	East Leon Creek	Monument Creek	Leon Creek
January	3.25*	1.71	12.39
February	2.95	1.56	11.31
March	3.15	1.64	12.79
April	7.12	3.49	31.89
May	47.34	26.14	162
June	97.39	56.85	280
July	42.98	23.51	121
August	15.94	8.89	46.52
September	9.19	4.97	29.76
October	7.56	3.95	26.04
November	5.24	2.77	18.57
December	3.68	1.96	13.62

*Prediction errors for all estimates ranged from 44 percent (late winter, fall) to 80 percent (July and August)

Environmental Consequences

Alternative 1

Monument #1 Reservoir

USGS StreamStats calculations were used to estimate water yield of the watershed upstream from Monument #1 Dam. Water yield estimates of 5,591 and 6,573 acre-feet were used to estimate the reduction in discharge resulting from filling and re-filling Monument #1 Reservoir (Table 28). Ute Water plans to fill an enlarged Monument #1 Reservoir over a 3 to 5-year period, which means holding back 1,053-1,755 acre-feet of snowmelt discharge each spring (Table 28). Such volumes are 16-31 percent of the annual yield at Monument #1 Dam. These volumes are 2.6-4.3 percent of the annual water yield at Big Park (40,233 acre feet), and 2.3-3.7 percent of the annual water yield of the Leon Creek watershed (46,309 acre feet).

Assuming 20-30 percent of the total reservoir volume is retained each year of the filling period, 16-31 percent of the total annual discharge from Monument #1 Dam would be retained in the reservoir each year. Given the variability both in winter snowpack and discharge prediction precision it is reasonable to assume this amount of discharge reduction could be characterized as within the historic range of variation for this watershed. Reducing spring discharge in Leon Creek by 2.5 percent during a 3 to 5-year period during which an enlarged Hunter Reservoir would be filled is unlikely to have an effect on the animal and plant communities throughout the watershed.

Hunter Reservoir

USGS StreamStats calculations were used to estimate water yield of the watershed upstream from Hunter Dam. Annual water yield is approximately 2,962 acre-feet. Factoring in prediction errors, yield ranges from 592 to 5,331 acre-feet. Ute Water plans to fill an enlarged Hunter Reservoir over a 3 to 5-year period, which means holding back 268-447 acre-feet of snowmelt discharge each spring (Table 28). Such volumes are 9 to 15 percent of the annual yield at Hunter Dam, 1-2 percent of the annual yield at the

mouth of East Leon Creek, about 0.7 percent of the annual yield at Big Park and 0.5 percent of the annual yield of the Leon Creek watershed.

The filling period for an enlarged Hunter Reservoir is 3 to 5 years. Assuming 20-30 percent of the total reservoir volume is retained each year of that period, 9 to 15 percent of the total water yield from Hunter Dam would be retained in the reservoir (Table 28). Filling Hunter Reservoir over a 3-5 year period would result in a 1-2 percent reduction in the water yield of East Leon Creek, which is 23,634 acre feet per year.

Table 28. Reservoir fill and re-fill scenarios. Numbers in parentheses are percentage of watershed's annual water yield for each volume.

	3-year fill (acre-feet)	4-year fill (AF)	5-year fill (AF)
Hunter Reservoir	447 (15)	335 (11)	268 (9)
Monument Dam: 5,591 acre feet Annual Water Yield			
Monument #1, Alternative 1	1,756 (31)	1,317 (24)	1,053 (19)
Monument #1, Alternative 2	2,199 (39)	1,648 (29)	1,320 (24)
Monument Dam: 6,573 acre feet Annual Water Yield			
Monument #1, Alternative 1	1,756 (27)	1,317 (20)	1,053 (16)
Monument #1, Alternative 2	2,199 (33)	1,648 (25)	1,320 (20)

Given the variability both in winter snowpack and discharge prediction precision it is reasonable to assume this amount of discharge reduction could be characterized as within the historic range of variation for this watershed. Even if a 10-15 percent reduction in spring discharge was above normal, the effects would be restricted to the 3-5 year filling period. Reducing spring discharge in Leon Creek by 0.5 percent during a 3 to 5-year period during which an enlarged Hunter Reservoir would be filled is unlikely to have an effect on the animal and plant communities throughout the watershed.

The cumulative impact of flow reductions under Alternative 1 is properly analyzed considering both Hunter Reservoir and Monument #1 Reservoir. Water yield upstream from these dams is approximately 3 percent of the total water yield of Leon Creek. Approximately 2.5 percent of the total yield of the Leon Creek watershed will be retained in Monument #1 Reservoir and 0.5 percent of the total yield would be retained in Hunter Dam. Once filled, both reservoirs would be maintained at or near full volume in most years.

Planned reservoir operations entail the use of some or all of the water in Monument #1 Reservoir and Hunter Reservoir to satisfy a portion of Ute Water's 21,400 acre foot firm yield requirements during drought conditions. The data presented in Table 28 can be used to evaluate how reservoir operations could affect the water yield of Leon Creek. For example, using the full volume of Hunter Reservoir in a single year would require 3-5 years to replenish during which time the water yield at Hunter Dam would be reduced 9-15 percent, the water yield at the mouth of East Leon Creek would be reduced by 1-2 percent, and the water yield at the mouth of Leon Creek would be reduced by 0.5 percent. Using less than the full volume of Hunter Reservoir in a single year would shorten replenishment time but not the proportional reduction in water yield. While Ute Water could potentially reduce the impact to the annual hydrograph of East Leon Creek by extending the time to refill the reservoir, this approach could limit the availability of water in the reservoir for use during drought periods.

Similar scenarios can be developed for water stored in Monument #1 Reservoir. Accessing the full volume of the reservoir in a single year would result in a 3-5 year reduction in water yield at Monument #1 Dam, the mouth of Monument Creek, and the mouth of Leon Creek. Because water yield at the mouth of Monument Creek is approximately 24-28 percent of the water yield at the mouth of East Leon Creek (5,591-6,573 acre feet versus 23,634 acre feet), the relative reduction in stream flow due to operations of

Monument #1 Reservoir would be greater than those at Hunter Reservoir. As with Hunter Reservoir, Ute Water could lessen the annual reduction of water yield from Monument #1 Dam by extending the time of refill the reservoir; however, this approach could limit the availability of water from this facility during extended droughts.

Alternative 2

Monument #1 Reservoir

Estimates of annual water yield vary between 5,591 acre-feet (USGS StreamStats) and 6,573 acre feet (Ute Water). Prediction errors for the StreamStats estimate, yield ranges from 1,118 to 10,063 acre-feet. Ute Water plans to fill an enlarged Monument #1 Reservoir over a 3 to 5-year period, which means holding back 1,320-2,199 acre-feet of snowmelt discharge each spring (Table 28). Such volumes are 24 to 39 percent of the annual yield at Monument Dam, about 2.7 percent of the annual yield at Big Park (40,233 acre feet), and about 2.4 percent of the annual yield of the Leon Creek watershed (46,309 acre feet).

The filling period for an enlarged Monument #1 Reservoir is 3 to 5 years. Assuming 20-30 percent of the total reservoir volume is retained each year of that period, 19 to 31 percent of the total volume of flow in Monument Creek would be retained in the reservoir (Table 28). Given the variability both in winter snowpack and discharge prediction precision it is reasonable to assume this amount of discharge reduction could be characterized as within the historic range of variation for this watershed. Reducing spring discharge in Leon Creek by 2.4 percent during a 3 to 5-year period during is unlikely to have an effect on the animal and plant communities throughout the watershed.

Reservoir operations at the Monument #1 facility under Alternative 2 would be similar to operations described for Alternative 1. Re-filling the reservoir over 3-5 years would reduce water yield at the mouth of Monument Creek by 20-39 percent, 3-5 percent at Big Park and the mouth of Leon Creek. As with Alternative 1, Ute Water could lessen the annual reduction of water yield from Monument #1 Dam by extending the time of refill the reservoir; however, this approach could limit the availability of water from this facility during extended droughts.

No Action Alternative

There would be no change to hydrology from the existing conditions under the No Action Alternative.

Summary of Mitigation and Beneficial Effects

Ute Water has agreed to provide a 0.5 cfs instream flow out of Hunter Dam from November through March in order to augment water volume in the creek at the time of year when streamflow is lowest. The additional winter flow volume has the potential to benefit resident aquatic life as well as connectivity between the stream channel and riparian areas via hyporheic flow. Benefits from an additional 0.5 cfs released from Hunter Dam are likely to accrue downstream in the Leon Creek watershed. An instream flow out of Hunter Dam is only possible under Alternative 1, in which Hunter Reservoir is enlarged.

Under Alternative 1, Ute Water proposes to provide a flushing flow from Hunter Reservoir every three years.

No instream flow or flushing flow is proposed from Monument Dam for either Alternative 1 or 2. Field observations confirm that a very short section of Monument Creek is dewatered by Monument Dam and the channel accretes measurable stream flow in close proximity to the dam. Additionally, unlike East Leon Creek downstream from Hunter Dam, there have been no recent observations of stream fishes in

this creek. Under Alternative 2 Ute Water could potentially provide a flushing flow from Monument #1 Reservoir that would benefit Leon Creek.

Wetlands

Existing Conditions

Wetlands on the Grand Mesa

According to the Colorado National Heritage Program there are 2,102 square miles (1,345,280 acres) of wetlands in Colorado, which is about 2 percent of the land area of the state. More than 10 percent (174,999 acres) of the state's wetlands are located in the Upper Colorado River watershed, which includes the Grand Mesa and the Leon Creek watershed. The USFWS's National Wetland Inventory database reveals there are 14,602 acres of wetlands on the Grand Mesa, nearly 22 percent of the estimated 68,087 acres of wetlands on the GMUG. The total wetlands acres identified in the National Wetland Inventory database represent about 2 percent of the total land area of the GMUG.

In 2008, the GMUG embarked on a study to identify the frequency, size, condition, and threats to fen wetlands on the National Forest. The study revealed a reasonable estimate of the number of fens on the GMUG is somewhere between 911 and 2,565, covering between 4,098 and 17,970 acres. On the Grand Mesa there are between 213 and 639 fens, covering between 1,038 and 4,729 acres.[6]

Wetlands in the Leon Creek Watershed

National Wetlands Inventory data reveal there are approximately 1,452 acres of wetlands in the Leon Creek watershed, about 5 percent of the total watershed area. Wetlands are classified as either freshwater emergent or forested in the Inventory. There are approximately 1,072 acres of freshwater emergent wetlands in the watershed. According to the Federal Geographic Data Committee's 2013 publication *Classification of Wetlands and Deepwater Habitats of the United States*, emergent wetlands are those that maintain the same appearance year after year. Emergent wetlands are sometimes called marshes, wet-meadows, fens, and sloughs (Federal Geographic Data Committee 2013). There are approximately 380 acres of forested-shrub wetlands in the watershed. Trees are the dominant life form in forested wetlands. In western mountains, forested wetlands occur in moist areas, particularly along rivers (Federal Geographic Data Committee 2013).

Monument #1 Reservoir

The wetland complex at Monument #1 Reservoir is approximately 37 acres in size. Expanding the reservoir as part of the proposed action will impact 26.5 acres of this complex. Expanding the reservoir under Alternative 2 would impact approximately 33.5 acres of this complex. It is unclear was proportion of this complex qualifies as "waters of the United States;" however, approximately 14.5 acres have a direct surface connection to the existing Monument #1 Reservoir and Monument Creek and are considered "waters of the United States." Wetland types present at the reservoir site and along NFST 518 include wet meadows, forested wetlands, and fringe wetlands along stream and reservoir boundaries (Claffey Environmental Consulting, Inc. and Bio-Logic, Inc., 2013). There are no known fen wetlands in the enlarged reservoir footprint or along NFST 518 between Leon Creek and Monument #1 Dam.

[6] These ranges reflect 95 percent statistical confidence intervals for the point estimates for fen frequency and area presented in the fen study. The proper interpretation of these ranges is, for example: based on the data that were collected, there is a 1 in 20 (5 percent) chance that the actual number of fens on the Grand Mesa is less than 213 or greater than 639.

Monument #2 Reservoir

The wetland complex at Monument #2 Reservoir is approximately 19.47 acres, of which 19.37 acres is inside the reservoir footprint (Claffey Environmental Consulting, Inc. and Bio-Logic, Inc., 2013). The site contains a 3.18-acre fen, which has been impacted by reservoir operations but has the potential to be restored (Claffey Environmental Consulting, Inc. and Bio-Logic, Inc., 2013). Other wetland types at the site include wet meadows and fringe wetlands along stream and reservoir boundaries.

Hunter Reservoir

The wetland complex at Hunter Reservoir is approximately 44.6 acres (WestWater Engineering 2005). Wet meadows make up most of this and the complex features a 1.9-acre fen wetland. Approximately 31.1 acres of wetland, including the fen wetland, would be inundated by an enlarged Hunter Reservoir. It is unclear how much of this wetland complex qualifies as "waters of the United States;" however, approximately 25 acres of affected wetlands have a direct surface connection to the existing Hunter Reservoir and East Leon Creek. The GMUG will coordinate mitigation with Ute Water to insure compliance with EO 11990, which establishes a goal of "no net loss" of wetlands in the United States.

The fen at Hunter Reservoir has been impacted substantially by reservoir operations and is likely less than 20 percent of its original size (G. Austin, USBLM, personal communication). Wetlands within the existing reservoir footprint have been inundated each spring and then exposed to air each fall since Hunter Reservoir has been in operation. This cycle causes a fen's peat mat to become oxygenated, which results in the peat mat separating from groundwater (Austin and Cooper 2015). From their sample of 89 fens, Austin and Cooper (2015) characterized 46 these as having little or no impact. The area occupied by these relatively pristine fens is approximately 198 acres. The fen at Hunter Reservoir is not one of the 46 (Austin and Cooper 2015).

As part of their fieldwork, Austin and Cooper sampled vegetation diversity at 308 sites distributed among 111 potential fens on the Grand Mesa. The protocol included 106 plant species. Sites contained between 1 and 19 species. Two sites at Hunter Reservoir contained 2 and 8 species, respectively (Austin and Cooper 2015). According to a wetlands delineation performed in 2005, the three dominant vascular plant species within the Hunter fen site are *Pedicularis groelandica*, *Carex saxattilis*, and *C. aquatilis* (WestWater Engineering, 2005). These species are common wetland plants at local, regional, and global scales.[7] Austin and Cooper measured the diversity of mosses and liverworts (bryophytes) at their field sites. Bryophyte diversity ranged from 0 to 5 species across 303 sites on the Grand Mesa. Two sites at Hunter Reservoir contained 0 and 3 bryophyte species, respectively (Austin and Cooper 2015). Austin (2008) located three bryophyte species at the Hunter fen: *Aulacomnuim palustre, Climacium dendroides, and Drepanocladus aduncus* (Austin 2008). An internet search using the scientific names revealed each of these species are found throughout the U.S. and Canada as well as on several other continents.

In addition to wetlands in the vicinity of Hunter Reservoir, access roads to the reservoir (NFSR 262, NFSR 280) cross riparian wetlands and wet meadows along Leon Creek and East Leon Creek 26 times (WestWater Engineering 2005). The road's impact to these areas include significant erosion inside and outside wetlands along with decreased flood storage associated with lateral movement of water through riparian wetlands. The road impacts directly about 0.8 acres (West Water Engineering, 2005, 2009). The total area of impact; however, as defined by areas of visibly damaged soils and increased erosion, is approximately 20 acres.

[7] Source: plants.usda.gov. Accessed November 2, 2016.

Jensen Reservoir

Jensen Reservoir, located in the Plateau Creek watershed,[8] contains a 29.5-acre wetland complex (West Water Engineering 2009). The wetland complex contains a fen that is between 5 and 35 acres in size (Austin and Cooper, unpublished data). Research suggests the fen may have occupied the entire reservoir footprint prior to the construction of the dam (West Water Engineering 2009; Austin and Cooper, unpublished data). Jensen Reservoir is an active water storage facility. The wetland complex at the site is exposed to fluctuating water levels. Reservoir operations have resulted in damage to the fen at Jensen Reservoir and full recovery of the fen, should reservoir operations cease, is unlikely in the foreseeable future. However, the site contains a remnant peat mat and it is possible peat formation could be resume following dam removal (G. Austin, personal communication, November 3, 2016). There is a constellation of 6 smaller fens surrounding Jensen Reservoir (Austin and Cooper, unpublished data). One of these has been examined in detail and is considered un-impacted (Austin and Cooper 2015). Other wetlands at the Jensen Reservoir site include wet meadows and fringe wetlands along the existing reservoir boundary.

The wetland complex at Jensen Reservoir was examined in detail by Austin and Cooper (2015). Eight species of vascular plants were observed at the site. One species of bryophyte, *D. aduncus*, was observed at the site (Austin and Cooper, unpublished data). The Cloud fen, located directly to the east of Jensen Reservoir is approximately 0.8 acres. The Cloud fen contains 8 species of vascular plants and 3 bryophytes (Austin and Cooper, unpublished data).

Environmental Consequences

Alternative 1

Monument #1 Reservoir

Enlarging Monument #1 Reservoir would inundate approximately 24.4 acres of the 37-acre wetland complex at this site. Most of these wetlands would be inundated for the life of the reservoir. Wetland functions related to wildlife habitat and water filtration performed by these wetlands would, at best, be reduced substantially and would more likely be lost. Wetland functions performed by peripheral wetlands will most likely be retarded in years during which these areas are not underwater. The net impact to wetlands at Monument #1 Reservoir would be less than 24.4 acres because of wetlands restoration resulting from improvements to NFSRs 262 and 280, NFST 518, and decommissioning of Monument #2 Reservoir (see below).

Hunter Reservoir

Enlarging Hunter Reservoir would inundate 22.5 acres of the wetland complex at the site. Based on Ute Water's projections for reservoir operations, the fen at Hunter Reservoir would be inundated 6-7 of every 10 years during which the reservoir is operational. Functions related to wildlife habitat and water filtration would be reduced substantially and more likely lost. Functionality of peripheral wetlands, including the fen, would be lost all years in which they are under water. Subjecting fens to fluctuating water levels has been shown to damage their peat mats (Austin and Cooper 2015). The net impact to wetlands at Hunter Reservoir would be less than 22.5 acres because of wetlands restoration resulting from improvements to NFSRs 262 and 280, NFST 518, and decommissioning of Monument #2 Reservoir (see below).

[8] According to the National Academy of Sciences's Committee on Mitigating Wetland Losses, "wetland place in the landscape is generally not considered a mitigation performance standard" because the location of mitigation sites may be limited. 404(b)(1) guidelines (230.93(b)(1)) state that mitigation sites should be located within the same watershed as the impact site.

Alternative 2

Monument #1 Reservoir

Enlarging Monument #1 Reservoir would inundate approximately 33.5 acres of the 37-acre wetland complex at this site. Most of these wetlands would be inundated for the life of the reservoir. Wetland functions related to wildlife habitat and water filtration performed by these wetlands would, at best, be reduced substantially and would more likely be lost. Wetland functions performed by peripheral wetlands will most likely be retarded in years during which these areas are not underwater. The net impact to wetlands at Monument #1 Reservoir would be less than 33.5 acres because of wetlands restoration resulting from improvements to NFSRs 262 and 280, NFST 518, and decommissioning of Monument #2 Reservoir (see below).

No Action Alternative

Under the No Action Alternative, the Forest Service would not approve the enlargement construction of any reservoir analyzed in this document and wetlands along roads and trails and at the three reservoir sites would not be affected. Under a no-action alternative existing conditions at Monument #1 and #2 Reservoirs, Hunter Reservoir, Big Park, and Jensen Reservoir would remain unchanged. The wetland complexes at these sites would remain in their current condition, providing wildlife habitat, water storage, and water filtration. No improvements would be made to NFSR 262, NFSR 280, or NFST 518 and riparian areas would not be restored along East Leon Creek, Leon Creek, and Monument Creek.

Net Wetlands Impacts by Alternative

Improvements to transportation infrastructure are a necessary component of Ute Water's proposal to expand Hunter Reservoir or Monument #1 Reservoir. Additionally, a transfer of the point of storage for Monument #2 Reservoir into Monument #1 Reservoir is a component of Ute Water's operational plan for Monument #1 Reservoir under both Alternative 1 and 2. These actions will result in wetlands restoration, as defined in Section 230.92 of the Clean Water Act's 404(b)(1) guidelines, and offset a portion of wetlands impacts resulting from the expansion of Hunter Reservoir or Monument #1 Reservoir (Table 29). Any wetlands impacts not offset by aspects of the proposed action would be subject to compensatory mitigation requirements of the Clean Water Act and Executive Order 11990.

Table 29. Net wetlands impacts (acres) from Alternatives 1 and 2. Negative values represent wetlands restoration resulting from project-related activity.

	Alternative 1	Alternative 2
Wetlands Inundation	46.9	33.5
NFSR 262 Road improvements and riparian wetland restoration	-1	-1
NFST 518 road improvements and riparian wetland restoration	-1	-1
NFSR 280 road improvements and riparian wetland restoration	-20	-*
Monument #2 Reservoir decommissioning	-19.3	-19.3
Net impact to wetlands	5.6	12.2

*Restoration of NFSR 280 is available as compensatory mitigation for Alternative 2.

Summary of Mitigation and Beneficial Effects

The data in Table 29 show that Ute Water would be required, in order to comply with Clean Water Act regulations and the no net loss stipulation of Executive Order 11990, to provide compensatory mitigation for wetlands impacts of at least 5.6 acres for Alternative 1 and at least 12.2 acres for Alternative 2. In a meeting on May 8, 2017, Ute Water acknowledged that they will have to obtain a new wetlands

delineation along NFSR 262 and NFSR 280, NFST 518, as well as Hunter Reservoir and Monument #1 and #2 Reservoirs. New delineations will be necessary to calculate accurately net wetland impacts. The data presented in Table 29 are sufficient to show that net impacts to wetlands are substantially less than the area of wetlands that will be inundated by implementing Alternatives 1 or 2.

On February 16, 2017, the Forest Service hosted presentations by USBLM scientist, Gay Austin, and Colorado State University professor, Dr. David Cooper. Ms. Austin's presentation included discussions of fen biology and ecology and exposition of the condition of fen wetlands at Hunter Reservoir, Monument #2 Reservoir, and Jensen Reservoir. Dr. Cooper's presentation focused on fen restoration techniques and evidence of his success in restoring fen wetlands in the United States and Canada.

Ms. Austin and Dr. Cooper suggested the wetland complexes at Monument #2 Reservoir and Jensen Reservoir had great potential for successful fen restoration. In both cases restoration would be defined as demonstrable peat accumulation and carbon sequestration. Dr. Cooper described several case studies in which peat accumulation and carbon sequestration functions at damaged fen wetlands were fully restored in less than 10 years. If funding were available, Dr. Cooper stated his team would be able to collect preliminary data at both sites this summer (2017).

This meeting compliments the existing body of work on the potential for wetlands restoration to serve as mitigation for this project. For example, in 2013 Claffey Ecological Consulting, Inc. and Bio-logic, Inc. prepared a draft mitigation plan for the wetlands complex at Monument #2 Reservoir.

Potential mitigation for this project that would insure NEPA, Clean Water Act compliance, and a no net loss of wetlands will take place at one or more of the following locations:

- Monument #2 Reservoir – an impacted wetland complex that is at least 19.3 acres in size. The site contains a remnant peat mat with high potential for restoration as well as at least two intact fen wetlands. Restoration activities include removal of the dam, associated infrastructure, and the access road. Additionally, Ute Water commissioned a mitigation plan for the site which details wetlands restoration activities (Claffey Ecological Consulting, Inc. and Bio-logic, Inc., 2013). Wetlands restoration at Monument #2 Reservoir offsets a portion of wetlands impacts for either Alternative 1 or Alternative 2. Specific actions include 1) transferring the point of storage for the Monument #2 water right into Monument #1 Reservoir; 2) decommissioning Monument #2 reservoir and removing the associated infrastructure; 3) active restoration of the wetland complex at the Monument #2 site. Wetlands restoration resulting from the first two actions will be used by the Forest Service in its calculation of net wetlands impacts for which compensatory mitigation will be required (Table 29). Active wetlands restoration at the Monument #2 site could be used as compensatory mitigation for impacts to wetlands; however, even though active re-establishment of wetlands functionality at Monument #2 Reservoir would result in benefits to wetlands beyond those associated with decommissioning, restored acres will only count once toward Clean Water Act and Executive Order 11990 compliance. Decommissioning followed by active restoration of wetland functionality would qualify as rehabilitation and re-establishment as defined by Section 230.92 of the Clean Water Act's 404(b)(1) guidelines.

- Jensen Reservoir – an impacted wetland complex that is at least 30 acres in size. The site contains a remnant peat mat with high potential for restoration as well as at least seven intact fen wetlands surrounding the reservoir. A 37.9 acre reservoir is authorized at the site by an 1891 Land Act easement and it is believed that the entire reservoir footprint was a wetland complex, including a large fen, prior to construction (WestWater Engineering, 2009). The remnant peat mat (indicative of a fen) may be over 30 acres in size (Gay Austin, BLM, personal communication). Ms. Austin and Dr. David Cooper, Colorado State University, believe this site has a high potential for

restoration of fen functionality. Because of the uncertainty regarding the size of the wetland complex at the site (and the concomitant uncertainty about its value as mitigation) Ute Water has acknowledged they will need to perform a wetlands delineation prior to the beginning of mitigation activities (Steve Ryken, Ute Water Conservancy District, personal communication). Any wetlands restoration work at Jensen Reservoir could be used as compensatory mitigation for wetlands impacts resulting from Alternatives 1 or 2. This site has the potential to provide 30-50 acres of compensatory mitigation, including rehabilitation, re-establishment, and preservation of wetlands as defined in Section 230.92 of the Clean Water Act 404(b)(1) guidelines.

- NFSR 280 – the road from the junction of NFSR 262 and NFST 518 up to Hunter Reservoir. Improvements to this road would result in restoration of riparian wetlands. According to a 2009 mitigation plan prepared by WestWater Engineering, NFSR 280 crosses through wetlands 17 times. These crossings would be improved or removed, through a road re-route, and buffers established in order to restore riparian wetlands. Improvements to NSFR 280 and the resulting benefits to wetlands are part of Alternative 1 and will be used by the Forest Service in its calculation of net wetlands impacts for this project (Table 29). Improvements to NFSR 280 could be used as wetlands-specific compensatory mitigation for Alternative 2. This site has the potential to provide approximately 20 acres of compensatory wetlands mitigation following the implementation of Alternative 2.

The GMUG and Corps will coordinate mitigation activities with Ute Water in order to insure compliance with applicable laws and regulations, including the "no net loss" policy expressed in EO 11990.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Generally, the short-term uses of the environment required by the Proposed Action or its alternatives would not greatly affect the long-term productivity of the Project Area. The construction activities might create marginal disruption of some longstanding uses of the area by wildlife, domestic livestock, and winter recreationists. Such disruption would cease when the construction stopped. After all disturbed areas have been reclaimed, much of the same vegetation resources that were present prior to the project would be available, as restored vegetation and habitat would mitigate short-term environmental effects. Although the inundation of the enlarged reservoir or new construction of reservoirs would cause the long-term loss of some wildlife habitat and domestic forage, which would not be enough to affect local wildlife populations or permitted grazing. All short-term impacts must be considered within the long-term context of the project's goal: storing drinking water for human use. Additionally, changes to the distribution of functional wetlands in the Leon Creek watershed would not result in a net loss of wetland function in the area.

Unavoidable Adverse Effects

There are a number of short-term unavoidable adverse effects of any action alternative, which are related to construction activities on roads and at reservoir sites. Effects include increased traffic (primarily construction-related) on NFSR 262, NFSR 280, and NFST 518, wildlife disturbance via human presence,

noise, and traffic, release of GHGs, from construction equipment, in the air shed above Leon Creek during the 7-9-year construction window.

The primary unavoidable long-term adverse effect of alternatives 1-2 is inundation of up to 213 acres of National Forest lands. The proposed action would result in two reservoirs having a total surface area of 213 acres. Inundated lands would be unavailable for use as terrestrial wildlife habitat, livestock production, timber production, or other extractive activity. Any action alternative would change the distribution of wetlands and wetland function in the Leon Creek watershed. Wetlands would be inundated as a result of alternatives 1-2. Alternative 1 (the proposed action) includes a mitigation plan that would re-establish wetland acres and function at multiple sites and restore wetland function in riparian areas along East Leon Creek, Leon Creek, and Monument Creek. Alternative 2 would include the re-establishment of a wetland complex at Monument #2 Reservoir.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road. The following impacts are considered irreversible: loss of wildlife habitat and soil productivity beneath an enlarged dam footprint. The following impacts are considering irretrievable: water depletion resulting from evaporation at each enlarged reservoir, and change in distribution of wetland function in the watershed.

Cumulative Effects Analysis

Past, present, and future actions associated with recreation, timber management, and water development have the potential to affect wildlife habitat, water quality, and water quantity. We analyzed the cumulative effect of water development within the entire Plateau Creek watershed (as well as a portion of the Colorado River) and analyzed the cumulative effect of other activities, such as recreation and timber harvest, within a 260 square-mile portion (43 percent of the watershed area) of the watershed. Approximately 184 square miles of this area is managed the Forest Service. As Ute Water's proposal is part of a plan to prepare for water needs in 2045, we analyzed the potential for cumulative effects to the watershed out to that year.

The Plateau Creek watershed is approximately 601 square miles. The portion of the National Forest within the watershed supports several uses, including cattle grazing, recreation, timber harvest, and wildlife habitat. Recreational activities include fishing and hunting, ATV use, and snowmobile use. Recreational activities occur 12 months out of the year. There are approximately 983 acres of existing infrastructure within the 184 square-mile area, which represents about 0.8 percent of the analysis area. There are approximately 3,563 acres of historical timber harvest within this area, which is about 3 percent of the analysis area.

Mineral Development

There are 15 acres of existing disturbance in the Buzzard Creek watershed associated with gas well pad development. The Buzzard Creek watershed is located upstream of Vega Reservoir. Roads associated with existing gas well pads account for 4 of the 15 acres.
Forest Service records indicate no pending lease requests for the area. As depicted in the 1993 GMUG Oil and Gas Leasing EIS, the area to the east of the NRSRs 262 and 280, as well as Hunter Reservoir, is covered by the Discretionary No Leasing stipulation. The rest of the area is covered by No Surface Occupancy (NSO) stipulations, and a small area adjacent to the reservoir is covered by Standard Stipulations. DRMS shows no mineral or coal permits in the vicinity. Consequently, minerals

development is unlikely to contribute to cumulative impacts to water quality, water quantity, and wildlife habitat.

Recreation

We do not expect recreation to increase in the project area during construction of any dam. It is possible that road improvements will entice recreationists to venture south along NFSR 262. However, road improvements that would be conducive to travel in two-wheel drive and other low-clearance vehicles would not be completed the entire length of NFSR 262. Road improvements will facilitate access for the first 2-3 miles of NFSR 262, beyond the Forest boundary. Beyond that, the road will continue to be passable only by four-wheel drive and high-clearance vehicles.

Upon completion of an action alternative it is likely that Colorado Parks and Wildlife will stock fish to create either a recreational or conservation fishery. The Forest Service has no intention of developing infrastructure (e.g., campgrounds, parking areas, toilets) at any reservoir site in the upper Leon Creek watershed. It is likely that people will be attracted to a new fishery; however, travel to Big Park via ATV takes at least an hour and travel times are longer for full-sized vehicles. The remoteness of these sites is likely to dampen the enthusiasm of all but the most dedicated still-water anglers. The remoteness and relatively poor access is likely to have the same effect on other recreationists, including campers, hikers, and bird watchers. The contribution of this project to the cumulative recreation pressure within this part of the National Forest is likely to be insignificant.

Timber Harvest

Timber harvest, by way of road construction and ground disturbance during harvest as well as the removal of trees, has the potential to affect both water quality and water quantity. The Forest's 10-year harvest plan for subwatersheds on the north side of the Grand Mesa includes 8,560 acres of timber harvest. This is approximately 7 percent of the 184-square mile analysis area. Timber harvest areas are spread among 9 subwatersheds (USGS Hydrologic Unit Code 12). Subwatersheds range in size between 7,800 acres and 27,600 acres. The amount of harvest within a subwatershed ranges from 0.8 percent (228 acres in a 27,600-acre subwatershed) to 28 percent (2,220 acres in a 7,810-acre subwatershed).

Timber harvest activities including road construction, hauling, harvest, and yarding have the potential to compact soils over the entire 8,560 acre treatment area. Compacted soils could promote overland water flow and result in increased erosion (Chamberlin et al., 1991). A short-term effect of timber harvest would be some increase in water quantity. For example, research shows that clear cutting 40 to 100 percent of conifer or mixed-conifer timber in Colorado can increase short-term water yield 22 to 30 percent (Chamberlin et al., 1991).

Long-term degradation of water quality is a far more significant concern to the Forest Service considering the significance of many of these subwatersheds as sources of municipal water for towns and cities in western Colorado. Water quality variables typically influenced by timber harvest include temperature, fine sediment load, dissolved oxygen, and nutrients (Chamberlin et al., 1991). The proposed action is intended to store high-quality water for human use and activities that degrade water quality are contrary to this goal. If design features and best management practices failed simultaneously across the entire 8,560 acres, this could result in increased overland water flow and erosion on 7 percent of the 184 square-mile analysis area. That 7 percent is distributed across 9 subwatersheds and will occur over a 10-year period during which adaptive management practices will be used to repair damaged areas prior to initiating harvest activities at the next site. Design features and best management practices used by the Forest Service are designed to protect the integrity of riparian areas, which serve as important buffers when fine sediment is inevitably mobilized following timber harvest (Chamberlin et al., 1991).

It is not a foregone conclusion the Forest Service will offer all 8,560 acres of suitable timber land for sale in the next 10 years. Much of the area planned for harvest has been impacted by bark beetles and it is possible some areas may not be able to be harvested prior to the timber degrading to the point it is no longer merchantable. If the Forest Service does sell the entire planned volume of timber, the fact that timber harvest is spread among 9 subwatersheds and over a 10-year period suggests that timber harvest is likely to result in additive degradation of water quality in the Plateau Creek watershed.

The cumulative impact of timber harvest on wildlife habitat has been considered previously in the Forest Service's analysis of the Spruce Beetle Epidemic and Aspen Decline Management Response EIS.

Water development

The Colorado Water Rights database was accessed on September 9, 2016 in order to identify conditional water rights in the Plateau Creek watershed that could be developed between now and 2045. There are 114 conditional water rights in and around the project area, such as Monument #1 Reservoir, as well as downstream locations including the Colorado River. Sixty-nine of these (61 percent) are for 10 acre-feet or less. The volume of water associated with conditional water rights is 340,485 acre-feet, of which 243,372 acre-feet are associated with a reservoir site on the Colorado River, downstream from Glenwood Springs (Table 30).

Table 30. Conditional water rights within the cumulative effects analysis area.

Description	Volume (af)	Notes
Una-Paradise Reservoir	243,372	Colorado River, downstream from Glenwood Springs
Owens Creek Reservoir	31,786	Reservoir on private land
Buzzard Creek Reservoir	20,000	Reservoir on private land
Willow Creek Reservoir	19,448	Headwater tributary to Buzzard Creek
Jerry Creek #2 Reservoir	7,791	Additional enlargement of Jerry Creek Reservoir #2.
Salt Creek Reservoir	3,000	Main stem of Salt Creek, downstream from Leon Creek.
Various	100-499	13 projects; 1,975.3 acre feet total volume
Various	10-99	21 projects; 650.7 acre feet total volume
Various	1-9.9	58 projects; 202.9 acre feet total volume
Various	0-1	12 projects; 3.8 acre feet total volume

The primary impact of water development in the above table is water depletion in the Colorado River, which is likely to negatively impact native fishes and their habitat. To evaluate this we developed scenarios in which proportions of the total conditional water rights in the above table are developed in the next 30 years. We compared these to monthly discharge data for the Colorado River at its confluence with Plateau Creek and for Plateau Creek, when applicable.[9]

In the 2015 water year (October 2014 through September 2015), USGS gauge data show that approximately 3.05 million acre feet of water flowed past the Cameo gauging station, located upstream from Grand Junction, Colorado. For the 2014 water year the value was 3.4 million. The proposed action could reduce discharge in the Colorado River by 0.2 percent (6,008/3.05 million acre-feet) during the 6-10 year filling period; however, if every conditional water right included in the above table was

[9] For example, construction of Una-Paradise Reservoir will have no effect on Plateau Creek discharge whereas several other large reservoirs would decrease overall discharge from Plateau Creek.

developed, annual discharge in the Colorado River upstream from Grand Junction, Colorado, could be reduced by more than 11 percent.

We used a statistical re-sampling technique commonly referred to as "bootstrapping" (Sokal and Rohlf 1998) to simulate water development scenarios in which 1, 2, and 3 randomly selected water development projects occur each year of the 30-year analysis period. Developing 4 water rights each year is analogous to maximum development: all 114 water rights are developed by year 29. We constructed 5,000 simulations of 30 (1 project per year), 60, (2 projects per year), or 90 (3 projects per year) conditional water rights (Table 31).

Table 31. Results of 5,000 bootstrap simulations of three water development rates for conditional water rights in project area. All volumes are presented in acre-feet.

	1 project per year	2 projects per year	3 projects per year
Minimum volume	65	2,987	27,463
Maximum volume	308,447	339,209	340,404
Median volume	55,105	211,023	299,239
Average volume	88,496	180,926	269,249

The statistics in Table 31 reflect the highly skewed distribution of conditional water rights in the project area: about two thirds of the 114 conditional water rights are for volumes less than 10 acre-feet. Only 6 conditional water rights are for volumes great than 19,000 acre-feet. One of those is for 173,477 acre-feet. As mentioned above, if every conditional water right was developed in the next 30 years that would reduce the discharge of the Colorado River by 11 percent. If the median volumes presented in Table 35 were developed Colorado River discharge (3.05 million acre-feet in 2015) would decrease by 2, 7, and 9 percent, respectively.

Average annual discharge from Plateau Creek is approximately 159,000 acre-feet. The large reservoirs in the above table would result in the retention of significant portions of the annual discharge from Plateau Creek. The volume of Owens Creek Reservoir is approximately 20 percent of the annual discharge from Plateau Creek, Buzzard Creek Reservoir and Jerry Creek Reservoir #2 each are about 12.5 percent, and Willow Creek Reservoir is about 5 percent. Developing all of these reservoirs would result in the retention of approximately 50 percent of the total annual discharge from Plateau Creek, which would be a big deal.

Ute Water holds several conditional water rights in the Plateau Creek watershed. Ute Water plans to meet its firm yield need of 21,400 acre-feet through a blended-supply approach whereby water from Plateau Creek and the Colorado River are used to meet future water demand. Developing approximately 6,000 acre-feet of surface water storage in the watershed meets Ute Water's total surface water storage need under this plan. It is unlikely, upon completion of one or more reservoir projects in the Leon Creek watershed, that Ute Water will pursue additional surface water storage in the watershed.

Cumulative Impact to Water Quality, Water Quantity, and Endangered Fishes

Of the four activities considered in the cumulative effects analysis, recreation, minerals development, timber harvest, and water development, the last of these is the most likely to result in additive impact to the Plateau Creek watershed and they hydrograph of the Colorado River. It is unclear the rate at which conditional water rights will be developed in the area. The Colorado Water Rights database shows that many of the existing water rights have undergone proof of diligence proceedings at least once. As long as water right holders show diligence every five years they could conceivably hold onto these rights for decades without developing them.

Most of the water rights that are developed in the next 30 years will be those for volumes less than 10 acre feet. Three of the six biggest water rights considered in this analysis are for reservoir construction or enlargements presented in the Alternatives Considered but Dismissed from Detailed Study section of this document (Buzzard Creek Reservoir, Jerry Creek Reservoir, Owens Creek Reservoir). As such, they can be considered highly speculative. Should Ute Water implement either action alternative, their long-term development plan does not currently include complimentary reservoir development in another part of the Plateau Creek watershed.

Under a maximum development scenario, approximately 11 percent of the annual discharge of the Colorado River would be retained behind the 114 dams associated with the water rights in this analysis. As the Colorado River is over-allocated currently, an 11-percent reduction is significant. It is likely to increase the concentration of fine sediment and pollutants in Colorado River water, thereby reducing the overall water quality, quantity, and amount of water for native fishes. If applicable[10], the effects of water depletions associated with these developments would fall under the regulatory of the U.S. Fish and Wildlife Service via the Endangered Species Act.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders."

Air Quality

This proposal would have some short-term impacts on air quality levels for emissions and fugitive dust: however National Ambient Air Quality Standards (NAAQS) and Colorado Ambient Air Quality Standards (CAAQS) standards would not be exceeded by the Proposed Action or any alternative.

American Indian Treaty Rights

This proposal would not conflict with any treaty provisions of any Tribal group.

Congressionally Designated Areas

Wilderness: There are no lands designated in the project area as wilderness; therefore, there would be no impacts on Wilderness.

Wilderness Study Areas: There are no lands designated in the project area as Wilderness Study Areas (WSA) or recommended for wilderness classification; therefore, there would be no impacts on any WSA.

National Recreation Areas: There are no lands designated in the project area as National Recreational Areas; therefore, there would be no impacts on any National Recreational Area.

Floodplains (Executive Order 11988)

The project area and adjacent areas does contain floodplains. The project is short-term in duration, and BMPs are included that would reduce any impact to floodplains. The effects to floodplains would be mitigated so that there would be no long term impacts to those resources. A detailed discussion of impacts to watersheds and floodplains is found in DEIS section 3.3.

[10] Water depletions not previously accounted for in USFWS environmental reviews.

Colorado Roadless Areas (CRAs)

Impacts would occur to two Colorado Roadless Areas from all alternatives, including the No Action because both Hunter Reservoir and Monument #1 Reservoir are partially located within a CRA. A detailed discussion of impacts to Roadless Areas is found in Section 3.14.

National Landmarks

There are no national landmarks in the Project Area; therefore, none would be affected by the Proposed Action or its alternatives.

Municipal Watersheds

Effects to the Town of Collbran's municipal watershed, as well as Ute Water's municipal water supply could occur. A source water protection plan has been prepared and is being implemented for the Project Area, and recommendations for protection of those water supplies are included in the Design features outlined Appendix A. By implementing those design features, effects would be minimized or eliminated.

Implementation of the Proposed Action or the other action alternatives would result in additional storage of municipal water.

Parklands

There are no lands within the proposed Project Area that would be characterized as parklands; therefore, there would be no impacts on any parklands.

Prime Farmlands, Rangelands, and Forestlands

Prime Farmland: The project area is not located in or adjacent to prime farmlands; therefore, there would be no impacts to Prime Farmlands.

Prime Rangeland: The project does not contain prime rangeland because of soils and climate, and none of the proposed activities in the project would convert rangelands to other uses. Therefore, there would be no impacts on Prime Rangelands.

Prime Forestland: The project would not convert forestlands to other uses. All lands designated as forested would be retained and managed as forested; therefore, there would be no negative impacts on Prime Forestland.

Social Groups

The project would have no impacts on any social groups, including minorities, Native American Indians, women, or the civil liberties of any American citizen.

Wetlands (Executive Order 11990)

Implementation of the Proposed Action would result in the inundation 49 acres of wetlands in the project area. Inundation would be permanent in some areas, within the footprint of the low-water level of each reservoir, and periodic in others, along the margins of the high-water line of each reservoir. Wetlands impacts would be mitigated by the reestablishment or restoration of 68 acres of wetlands at the Monument #2 Reservoir site, the Jensen Reservoir site, and riparian wetlands along NFSRs 262 and 280.

Wild and Scenic Rivers

There are no lands designated or proposed for Wild and Scenic Rivers in the Project Area; therefore, the project would not impact any Wild and Scenic Rivers.

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Chapter 5. Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and other organization and individuals during the development of this environmental impact statement:

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U.S. Fish and Wildlife Service

Colorado Parks and Wildlife

Tribes

Ute Indian Tribe

Others

Wetlands specialists consulted for this project:

Dr. David Cooper, Colorado State University.
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Chapter 6. Distribution of the Environmental Impact Statement

This EIS will be distributed to individuals who specifically requested a copy of the document or to those who submitted substantive comments during scoping or during the comment period on the Draft EIS and to required and cooperative agencies and tribes, state and local governments and water user groups. It will be posted to the GMUG's Website and listed on the GMUG's Schedule of Proposed Actions.

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Appendix A. Design Features Common to Alternatives 1&2.

The following environmental protections are included as design features of the Proposed Action. These design features were derived from Ute Water's proposal, from law, regulation, and policy or were identified by the Forest Service or USACE to avoid or minimize environmental effects on specific resources. Design features should be considered integral to the analysis of effects in Chapter 3.

Air Quality

1. Air quality would be maintained by permitting of all regulated air pollution sources through the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division, assuring compliance with all federal and state standards.

2. Such additional methods and devices as are reasonable to prevent, control and otherwise minimize atmospheric emissions or discharges of air contaminants would be used, including:

    - No burning of cleared materials, combustible construction materials and rubbish.

    - Dust abatement techniques shall be used as directed by the Forest Service to minimize dust in a way such that visibility and air quality are not affected and a hazardous condition is not created. Dust will not reach a height of 12 feet.

Aquatic Wildlife

The following design criterion will apply to all action alternatives:

1. Prior to the initiation of construction, Ute Water will provide the USFS with documentation of the Section 7 Consultation with the U.S. Fish and Wildlife Service related to the water depletions associated with this project. Additionally, Ute Water will provide the USFS documentation of a signed Recovery Agreement (if applicable) for the four Endangered Colorado River fishes covering the depletions associated with this project.

2. Construction practices that maintain existing stream flows and minimize siltation and pollution, including construction of a bypass ditch around the construction activities, would be employed to protect aquatic species located downstream of the project. Best Management Practices described above for soil and water will be used to meet this objective.

3. Ute Water will ensure that a minimum conservation pool sufficient to maintain a fishery in Hunter Reservoir through the winter months is retained during the construction period.

Cultural Resources

The Forest Service and the CO SHPO office agreed on actions that would be included with all action alternatives in order to protect cultural sites located in the APE. The design features for preventing any adverse effect to the historic properties is discussed below.

Site 5ME18155: To mitigate impacts of the proposed project activities to site 5ME18155, the Monument Trail (FST 518) will be re-routed to avoid the site. The site will be avoided by at least 50 feet and will be monitored by an archaeologist during new route construction. Exclusion fencing will be used during construction if appropriate. After the access route has been re-routed to avoid the site, the existing track through the site will be reclaimed using off-site fill to ensure additional disturbance and water erosion do

not continue to affect the site. These actions will ensure that the project has no adverse effect to the site. Concurrence from the CO SHPO office was obtained on January 31, 2013.

Site 5ME18610: To mitigate impacts of the proposed project activities to site 5ME18610, the current access route, FSR 280, will be re-routed to avoid the site. The site will be avoided by at least 50 feet and will be monitored by an archaeologist during new route construction. Exclusion fencing will be used during construction if appropriate. After the road has been re-routed to avoid the site, the existing track through the site will be reclaimed by hand using off-site fill to ensure additional disturbance and water erosion do not continue to affect the site. These actions will ensure that the project has no adverse effect to the site. Concurrence from the CO SHPO office for the site eligibility status and avoidance measures to protect the site was obtained on January 31, 2013.

Geology

If the talus slopes on the south side of the reservoir rim at Hunter Reservoir are used as a source of borrow materials, the reclamation plan would ensure that the slope is not undercut or over steepened to create a potentially unstable slope.

Hazardous Materials and Emergency Response

1. The SPCC Plan described in the Soils Design features would assure compliance with all Federal and State requirements.

2. A Fire/Emergency Response/Health and Safety Plan that addresses the potential for accidents and injuries, and other emergencies would be prepared and submitted to the Forest Service for approval and kept onsite. This plan would be made available to the Forest Service prior to construction and kept on all active locations.

Historical and Archaeological Resources and Paleontology

1. All employees of Ute Water, contractors, subcontractors or other parties associated with the project would be instructed that, upon discovering evidence of possible prehistorical, historical or archeological objects, work would cease immediately at that location and the engineer would be notified, giving the location and nature of the findings. The Forest Service would be notified immediately. Care would be exercised so as not to disturb or damage artifacts or fossils uncovered during excavation operations.

2. The authorized officer would be immediately notified of all antiquities or other objects of historic or scientific interest, including but not limited to historic or prehistoric ruins, fossils, or artifacts discovered in connection with the use and occupancy authorized by this permit. Ute Water's employees, contractors, etc., would leave these discoveries intact and in place until directed otherwise by the authorized officer. Measures to protect the environment and mitigate environmental damage specified by the authorized officer would be the responsibility of Ute Water.

3. During project implementation, in the unlikely event of an inadvertent encounter of Native American remains or grave objects, the Native American Graves Protection and Repatriation Act (NAGPRA) requires that all activities must cease in their discovery area, that a reasonable effort be made to protect the items found or unearthed, and that immediate notification be made to the agency Authorized Officers as well as the appropriate Native American group(s) (IV C. 2). Notice of such a discovery may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions may also require compliance under provisions of the National Historic Preservation Act of 1966 (NHPA) and the Archaeological Resources Protection Act.

Hydrology

1. Implementation of Best Management Practices for the Proposed Action and the alternatives as described in the Soils Section below would minimize effects, such as sedimentation, from the construction activities on affected streams.

2. A Stream Diversion Plan would be developed prior to any construction activity. The plan would describe small diversion dams located in each of the drainages and diversion ditches used to cause the flows on the perimeter of the site into the existing East Leon Creek drainage or across the saddle located southeast of the existing dam.

3. Refueling or lubricating and storage of hazardous materials, chemicals, fuels, etc., would only take place in designated locations that are more than 100 feet from wetlands and other water bodies or drainages

Noise

Noise would be minimized by compliance with applicable laws and regulations regarding the prevention, control and abatement of harmful noise levels.

Soils

1. A Stormwater Management Plan would be prepared and submitted to the Forest Service for approval at least 30 days prior to starting construction.

2. Sediment and erosion controls would be installed prior to work involving site clearing, stripping and stockpiling topsoil, excavation and earthwork. The sediment and erosion controls would be maintained and repaired during the course of construction.

3. Excavated materials or other construction materials would not be stockpiled or wasted near or on stream banks, lake shorelines or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse itself.

4. At road intersections with existing drainages that cannot be easily carried by use of a temporary culvert, low-water crossings would be established. The approaches to any crossing would be armored by placing a minimum 8-inch depth of 1- to 3-inches of clean crushed rock, 14-feet wide for a distance of 20 feet on each side of the drainage to minimize siltation, bank rutting and erosion. Crossings would be constructed perpendicular to the flow line. When access is no longer needed, any temporary culverts and associated fill would be removed. Hardened low water fords shall be left in place. Silt fences or appropriate sediment control devices would be used to prevent siltation into existing drainages, ponds or associated riparian areas.

5. Ute Water shall prepare a Spill Prevention, Control and Countermeasures Plan (SPCC) and submit it to the Forest Service for approval at least 30 days in advance of construction.

6. Soil disturbing actions would be avoided during long periods of heavy rain or wet soils to prevent excessive rutting and mobilization of sediment during runoff events.

7. Because the construction would last several summers, plans to stabilize the construction sites over the winter would be developed and approved by the Forest Service in order to prevent runoff and sediment escaping the work sites.

8. Cross-drain spacing on roads will conform to the following specifications:

Table 32. Maximum cross-drain spacing (feet) based on soil types.

	Soil erosiveness*			
Road grade %	Extra	High	Moderate	Low
1-3	600	1,000	1,000	1,000
4-6	300	540	680	1,000
7-9	200	360	450	670
10-12	150	270	340	510
13-15	120	220	270	410

The erosiveness classifications listed above are based on the Unified Soil Classification system (ASTM D 2487). Extra erosive soils include silts and sands with little or no binder. Highly erodible soils include silts and sands with moderate binder. Moderate erosive soils include gravels and fines or sands with little or no fines. Low erosive soils include gravels with no fines.

9. During road reconstruction, initial clearing operations would fully contain material on-site and not allow material to move into wetlands or into the riparian zone. Excess excavated material and construction debris developed along roads near streams would be disposed of in an area outside of the riparian area and floodplain.

10. Upon completion of construction, Ute Water would re-grade, prepare a seed bed and reseed temporary road improvements

11. Any new road construction would be designed to avoid excessive grades (greater than 12%) for distance in excess of 200 feet.

12. Ute Water will obtain a mineral material contract from the Forest Service for use of borrow areas, both inside and outside of the current reservoir basin.

13. The following comprehensive reclamation plan was submitted by Ute Water as part of the Proposed Action. The Forest Service would either approve or modify this plan as part of the analysis and decision-making process:

14. Seed

    - Grass seed would be from the same or previous year's crop. Only certified weed-free seed would be used. All seed would be free of prohibited noxious weeds (as defined by the State), and would contain no greater than 1% other weeds. The labels from the seed bags would be provided to the Forest Service.

    - All sites will be seeded with the following mixture at a total rate of 19 lbs/acre of pure, live seed:

        - Mountain Bromegrass: 5 lbs/acre
        - Slender Wheatgrass: 3 lbs/acre
        - Thickspike Wheatgrass: 3 lbs/acre
        - Canby Bluegrass: 3 lbs/acre
        - Blue Wildrye: 3 lbs/acre
        - American Vetch: 2 lbs/acre

- Seed would be furnished and delivered premixed in the indicated proportions. Seed bag tags, or the equivalent, would be provided for each delivery of seed. Tags would show the guaranteed percentages of purity, weed content, germination, net-weight, date of seed testing and date of shipment.

15. Seedbed Preparation

    - A minimum of 6 inches of topsoil, borrowed on-site, would be placed over all areas disturbed during construction, including the bottom of the reservoir. The seeding would be limited to those areas of disturbance above normal reservoir water levels.

    - Topsoil would not be placed in water or while frozen or muddy conditions exist.

    - Topsoil would be compacted with a CAT D6 bulldozer or larger to the appropriate tilth, density, consistency and friability to provide a suitable growth medium for sprouting and seedling survival.

    - All areas would be graded to drain. The maximum slope steepness will be 3:1 unless otherwise shown on the project drawings or approved in writing by the project engineer.

    - The final surface of the topsoil would be left in a rough or "pocked" condition to encourage better vegetation growth. There would not be any localized low spots that would allow water to accumulate.

    - The seedbed would be prepared by contour cultivating 4-6-inches deep with a harrow or disc. All other areas that have been disturbed or compacted by equipment would be scarified to receive seed.

16. Seed Application: Seeding would be accomplished between September 1st and October 30th. No seeding would take place when soils are frozen or excessively wet or dry.

17. Mulch

    - Certified weed free straw mulch would be inspected and bound with twine as regulated by the Weed Free Forage Act, CRS Title 35, Article 27.5 and administered by the Colorado Department of Agriculture. Mulch would be accompanied by a certificate of compliance as defined in the rules and regulations of the aforementioned Act. Tags from the straw mulch would be provided to the Forest Service.

    - A uniform depth of certified weed free straw mulch would be applied to all seeded areas. Mulch would be applied at the rate of 2,000 lbs/acre.

    - Following application of mulch, tackifier would be applied in a slurry with water and wood fiber to all mulched areas. Tackifier would consist of a free flowing, non-corrosive powder produced from the natural plant gum of *Plantago isularos* (Desert Indianwheat).

      The powder would conform to the following requirements:

        - Protein content: 16 +/- 0.2%
        - Ash content: 2.7 +/- 0.2%
        - Fiber: 4.0 +/- 0.4%
        - PH, 1% solution: 6.5 – 8.0

18. Monitoring and Completion of Reclamation

    - All seeded areas would be maintained in good condition, reseeding and mulching if and when necessary, until a good, healthy, uniform growth is established over the entire area seeded and until vegetation is established.

- On slopes, actions would be taken to prevent washouts. Any washout that occurs would be re-graded and reseeded and the reseeded area would be maintained until vegetation is established.

- An area would be considered to be satisfactorily reclaimed when: a) Soil erosion resulting from the operation has been stabilized and b) A vegetative cover at least equal to that present prior to disturbance and a plant species composition at least as desirable as that present prior to disturbance has been established.

- Areas not demonstrating satisfactory reclamations as outlined above, would be rehabilitated, reseeded and maintained meeting all requirements as specified above.

19. Avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources by controlling soil erosion, erosion of road surface materials and water quality problems originating from construction, maintenance and use of roads.

20. Ensure that road improvements are designed with the mitigation measures outlined in the Forest Service National Best Management Practices for Water Quality Management on National Forest System Lands (FS-990a) specifically the following:

21. Locate roads to fit the terrain, follow natural contours, and limit the need for excavation

22. Locate roads as far from waterbodies as is practicable to achieve access objectives, with a minimum number of crossings and connections between the road and the waterbody.

23. Change designated season-of-use if necessary to mitigate adverse effects to soil, water quality and/or riparian resources.

Solid and Sanitary Waste

1. All solid waste (trash) that result from construction and completion activities would be contained in a metal bear-proof trash cage. All material in the trash cage would be removed from the location and deposited in an approved sanitary landfill.

2. Portable toilets would be provided for construction workers at the construction site and the work camp. These would be maintained and removed by Ute Water as appropriate.

Terrestrial Wildlife

1. Pre-construction surveys would be conducted. If any special status species or habitat is found to be present, Ute Water would coordinate with the Forest Service to determine the most effective means of mitigating or precluding impacts.

2. For Canada lynx, no snow compaction above baseline levels would be permitted.

3. Trees would be cut and removed at the reservoir basin after nesting season, beginning August 1 each year until snow limits travel.

Travel Management and Roads

1. A Forest Service Road Use Permit would be obtained by Ute Water for reconstruction and use of NFSRs accessing the reservoir sites.

2. Road and Trail Improvement Plan would be submitted to the Forest Service for approval a minimum of 30 days before construction begins. The Road and Trail Improvement Plan would include methods for road and trail maintenance and reconstruction.

3. Project-related vehicular traffic would be restricted to approved locations. Operational equipment would be restricted to the road prism and construction site at all times.

4. Mobilization and demobilization of heavy equipment would be scheduled during the week and not on weekends or holidays to avoid high public traffic periods.

5. Road Maintenance: NFSRs would be maintained according to Forest Service road management objectives. Existing NFSRs currently open for use would also receive pre-haul maintenance depending upon their condition and the needs of the project. Pre-haul maintenance would not include road reconstruction or repairs of an extraordinary nature, but would include maintenance of drainage structures, grading the road surface, corrections to cut/fill failures, spot rock applications and rolling dips, etc. Ute Water would consult with the Forest Service on the degree and manner of preconstruction maintenance, road reconstruction, and ongoing maintenance that would be required.

6. Temporary Roads: Roads constructed for temporary access would generally be short in length and used where the topography and drainage requirements are minimal and the potential impacts are low. Road construction and would be consistent with the Watershed Conservation Practices Handbook (FSH 2509-25-99-1). In general, these roads would serve no long-term need as roads; therefore, they would be closed and obliterated after use.

7. Cattle guards would be installed in the allotment boundary fence on NFSR 262 according to Forest Service Standards.

8. Ute Water would develop and implement a specific Traffic Control Plan prior to commencing construction. The Traffic Control Plan would be approved by the District Ranger. The plan would include control techniques such as signing and traffic delays, when necessary.

9. Ute Water would furnish, install and maintain all temporary traffic controls, including signage as directed by the Forest Service, which provides forest users with adequate warning of hazardous or potentially hazardous conditions associated with dam construction activities.

10. Ute Water would consult with the Forest Service on the removal of road improvements and the eventual reversion of the roads to a high-clearance, four-wheel-drive condition.

11. A seasonal closure gate on NFSR 280 would be installed as close to Hunter Reservoir as possible. This is necessary to reduce the tendency of some travelers to use the newly-realigned segment of NFSR 280 following construction and until the roadbed is dry, skirting the residual snow drifts to create a wider or even more resource impacting duplicate.

Vegetation

1. A Noxious Weed Management Plan would be submitted and approved by the Forest Service prior to construction. The plan would outline strategies to preclude the inadvertent introduction, establishment or proliferation of any noxious weed species in the Project Area. This plan would address four goals - prevention, treatment, monitoring and cooperative actions - and would provide specific management objectives and specific actions agreed to by Ute Water and approved by the Forest Service.

2. Preventative actions would include the cleaning of vehicles and equipment and inspection by the Forest Service prior to bringing them into the Project Area.

3. For imported gravel and fill material to be used in construction activities, every effort will be made to use a weed free source.

4. Weed surveys would be conducted prior to construction.

5. Treatments would be developed using integrated weed management principles for each species and situation. Treatments may include hand pulling, grubbing, mowing, mulching, seeding, burning, herbicide application and soil management.

6. Monitoring of noxious weeds would be conducted on a scheduled basis to detect new infestations, evaluate prevention and/or treatment success, and identify the need for re-treatment.

7. Ute Water would coordinate its efforts with the Forest Service to manage noxious weeds.

Visual Resources

1. To limit visual impacts, new roads would be located so they are visually screened (by topography or forest vegetation) from travel ways, when practicable.

2. Locations of work camps would be submitted to the Forest Service for approval.